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EDHEAD

Things were better in my day... not.

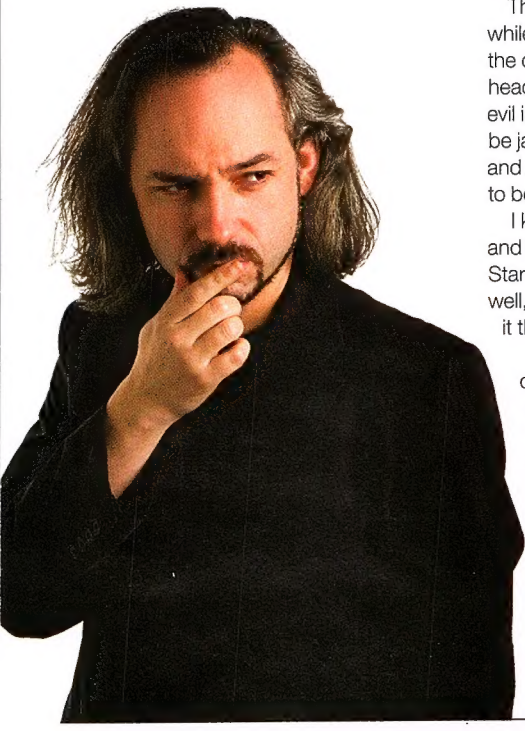
You know what the natural enemy of many games is?

It's nostalgia – pure and simple.

Nostalgia's something that any gamer or PC enthusiast knows all about. Either the games were just better back then, or the hardware releases and innovations of your day were so much better than what gets the kid excited now. Hell, Ben Mansill, Atomic's old editor, gets all old-timey every issue with our back-page column – of course, his nostalgia's all rosy and positive.

The kind of nostalgia I'm talking about is... not nice at all.

You see, this issue we look at Aliens Versus Predator. Or Aliens Vs Predator.



Look, let's call it AvP and be done with it. We loved Rebellion's first game, and AvP2, from back in 1999 or so, was even better. Great story, characters you care about, gripping gameplay... had it all. So when some of the same Rebellion devs said in a recent, pre-launch video that the new game was very much what they always wanted the first ones to be... well, we let ourselves get excited.

Mistake.

But it's a dual-layered mistake! You see, for one, no game can live up to that kind of expectation – the new AvP really isn't that good, but it suffers even worse when looked at through the lens of my love for the first game.

The second layer of evil is the fact that while I now really want to go back and play the original, I'm pretty sure I'd hate it. In my head, the game looks brilliant, but that's the evil influence of nostalgia. In reality, it would be jaggy, boxy, and likely play like a dog – and it'd ruin my memory of the experience to boot.

I know this from experience; I went back and tried to play Dark Forces, the original Star Wars FPS a few years ago, and it was... well, it was disappointing. Let's just leave it there.

So, a word of warning to developers – beware playing on nostalgia for classic titles. It can bite you in your xenomorphic arse.

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ISSUE 111

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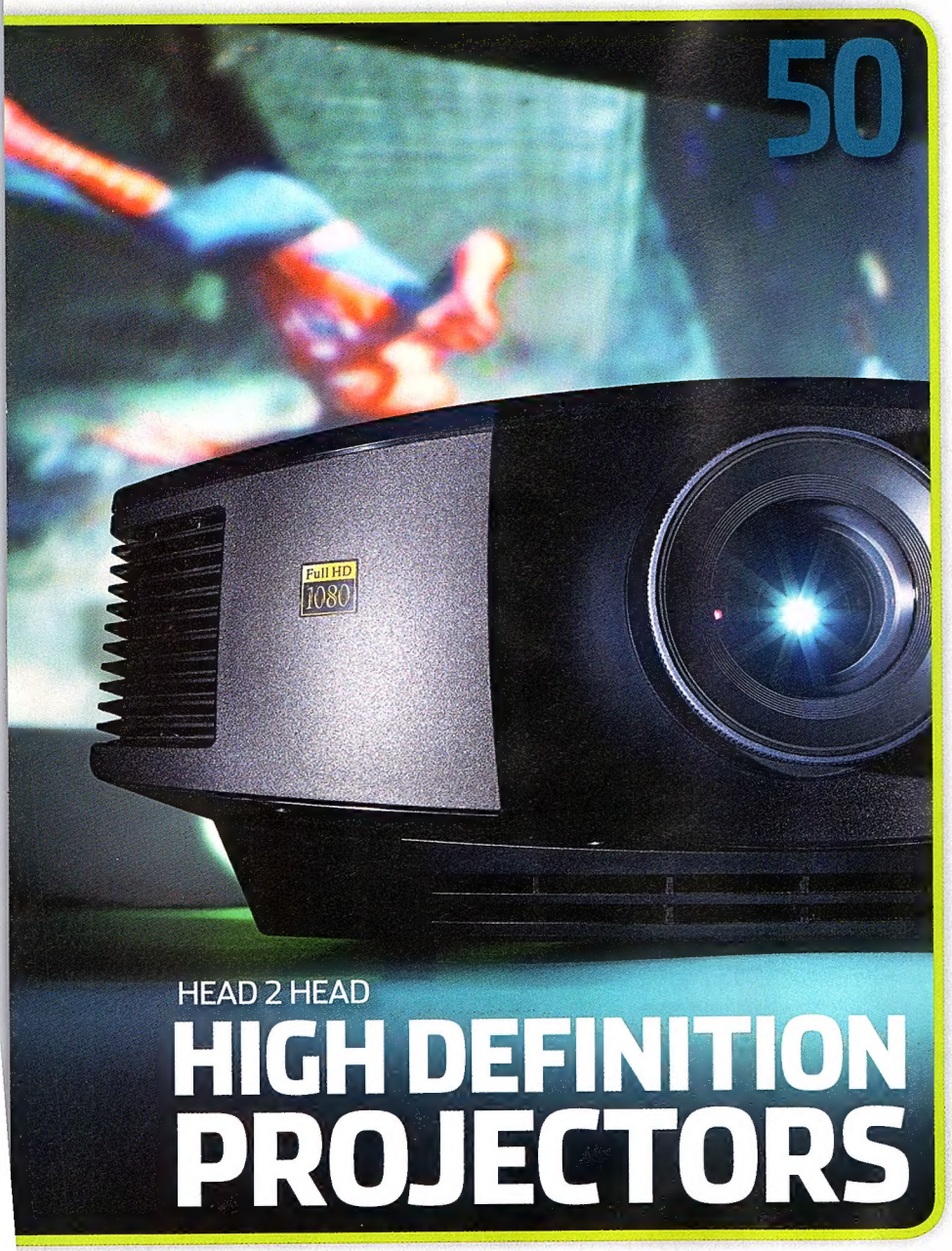
ISSUE 111



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pg 48

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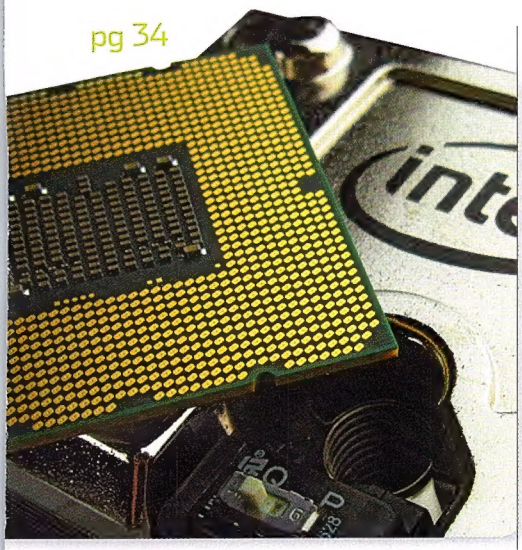

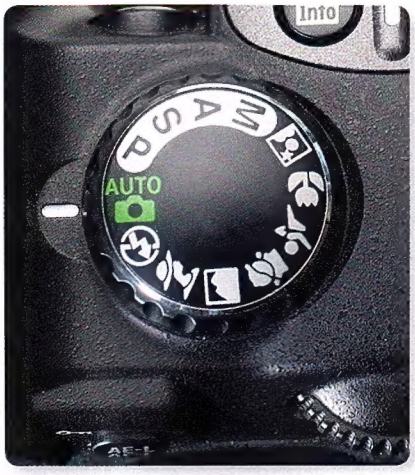

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Nintendo continues its anti-piracy crusade

Console maker and game publisher Nintendo forces local distributor to cease and desist selling DS mod chips.

Nintendo's on a tear when it comes to stopping pirates. The company successfully sued a lone gamer for pirating a Nintendo title, and now it's going after the suppliers of R4 SHDC Cards.

R4 cards allows users to a do a whole mess of stuff with their Nintendo DS, from watching movies and listening to music, to working on homebrew mods and applications. Sadly, it can also be used for copying games.

In a chest-thumping press release sent out today, Nintendo's announced a successful action against local supplier GadgetGear. The company has not only agreed to stop importing the R4 cards, but has also agreed - according to the release - that they are in fact "game copying devices [that] infringe both Nintendo's copyright and Nintendo's trademarks and that they are illegal circumvention devices."

Which, to editorialise, is akin to saying that a motor car is an illegal pedestrian murder device that violates the breathing rights of humans everywhere.

GadgetGear is also going to pay Nintendo $620,000 in damages - far less than the $1.5 million the alleged pirate settled to pay last week.

Nintendo also says in the release that it is "contemplating bringing further actions against other sellers of game copying devices in Australia." A quick Google search brings up a huge list of suppliers, both local and OS however - Nintendo's got its work cut out, but then again, it's got a lot more legal power to throw around.

What's also interesting to note is that a lot of suppliers, like R4card.com.au, explicitly state that using this card for copying is "illegal to use an R4 card for uses such as downloading illegal games, music, pictures, movies etc, this is backup device for property you own."

It's a worrying move, to be sure. Atomic's always supported the homebrew and console modding community; we will continue to do so, but it remains to be seen how far Nintendo's going to take its staunch anti-piracy campaign. Will the company end up targeting modding articles and tutorials?

Only time will tell.

We contacted Nintendo for comment, but no dice.

New EA games to feature 'Project $10'

Electronic Arts want to dip back into your pocket a second time.

The sale of games in Australia is a relatively lucrative business, with our local market booming and sales figures remaining relatively steady even throughout the recent financial crisis.

However, Electronic Arts have noticed one area of the market that they're not receiving anything from - the second hand market.

Retailers such as JB Hi-Fi, EB and GAME all have buy-back schemes that involve the store purchasing a used game back off customers, to then resell them with no profits leading back to the developer of the game.

EA noticed this, and have put their 'Project $10' into motion; a service that requires a unique online code to unlock the full amount of content in a game, but is not transferrable when the game itself is sold.

To unlock access to the new content, such as Mass Effect 2's Cerberus Network, you'll need to pay ten dollars to receive a new code to get the same experience as if you had bought the game new.

It's an interesting way of tackling the movement towards digital sales and increasing development costs of games, but whether or not it proves successful or merely frustrating remains to be seen.

FROM ATOMIC ONLINE

Every month we award the funky prize of a Cyber Snipa gaming mouse, as well as the love and respect of Atomicans everywhere, our winner of Post of the Month. And who deserves our applause and gentle bum-pats this month?

CptnChrysler! With his exploration of his MythTV build one year on.
http://forums.atomicmpc.com.au/index.php?showtopic=27924

Well done that man. But we also have some well-deserved runners up, starting with...

The Fuzz Damn you! who knows nothing about getting rid of trees.
http://forums.atomicmpc.com.au/index.php?showtopic=27514&st=20&p=555375&#entry555375

scruffy1, for telling it like it is.
http://forums.atomicmpc.com.au/index.php?showtopic=27348&st=20&p=552410&#entry552410

And, last but oh so not least, *osama_bin_athlon*, for winning big... and then not. But he sure kept us entertained.
http://forums.atomicmpc.com.au/index.php?showtopic=27665&st=0&p=558389&#entry558389

Thanks all, and thanks everyone who nominated posts this month. Keep 'em coming, kids!

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1. Ricoh CX 3

Price $499 **Website** www.ricoh.com.au

We like a bit of photography here at Atomic. Whether it be taking snaps of our favourite hardware for our site's First Looks, messing about with mates on the weekend, or even getting geeky and taking macro shots of painted Warhammer miniatures, we're all over that photo biznitch. So we kinda like Ricoh's new CX 3 range.

The CX 3 has a 28-300mm wide angle zoom lens, a 10 Megapixel CMOS, the same noise reduction technology used in Ricoh's larger models, and even a 1280 x 720 movie mode – what better way to capture embarrassing footage of your best friend doing something silly at two o'clock in the morning?!

2. LaCie LaCinema Mini HD

Price $399 **Website** www.lacie.com

LaCie LaCinema – get it? Hilarious!

And not only is it an entertaining title, it's a pretty entertaining product. Tiny media players are coming out of the woodwork at the moment, like our previous fave the WD HD Live. But the LaCinema goes a couple of steps farther...

For one, it boasts a 500GB internal drive, and for another – and we really like this – it's also wireless-N compatible. In our eyes, this makes it the perfect out of the box media player solution. Just point all your media downloads at this one device, which doesn't need annoying cabling all over the place, and you're set. It handles all popular files, including HD file types like .MKV.

About all it doesn't do is make popcorn or mix a mean martini. You'll still need to do that yourself.

3. Bark4Beer

Price Can you really put a price on awesome?

Website www.bark4beer.com

We like beer. We like pets. And we like cool tech. When cool tech can combine our love of beer and nature's creatures, we're in a happy place.

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And if you've always wanted to train your dog to be some kind of canine ninja, the Bark4Beer can also double as a handy-dandy garrotte.

(We like ninjas, too.)

4. World of Warcraft pets

Price $US24.99

Website http://us.blizzard.com/store

Aw. Lookit the little guy!

Ahem.

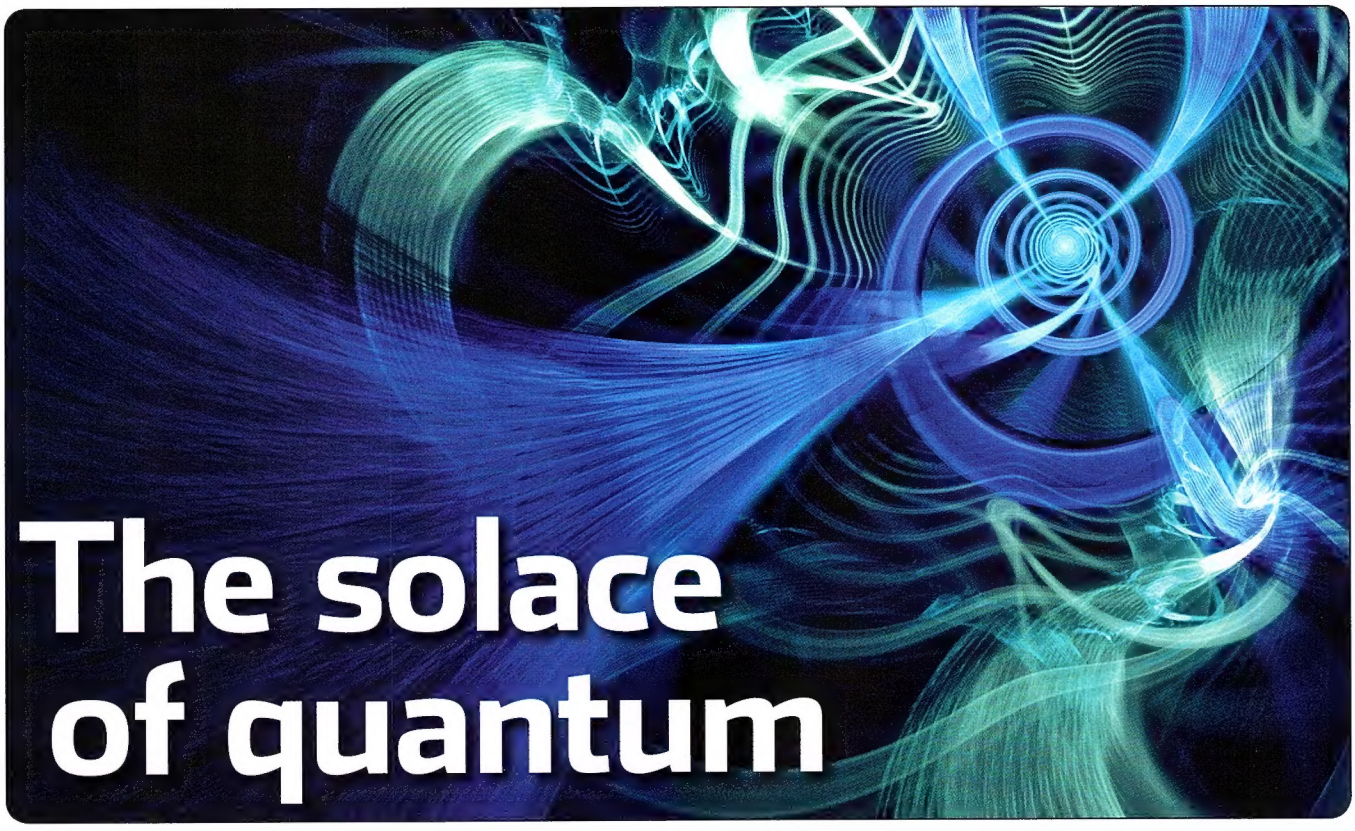
Anyway, Blizzard has just set the cute-glands of WoW fans a-dribbling with the release of two new plush toys. There's the baby Griffon, and the Windrider (pictured), both in ultra-cute plush. Need to impress your Warcraft-playing other half? This is guaranteed to work. And, even better, each pet comes with a unique code so you can then have the little beastie follow you round in-game – because Gods know, Hunters don't have nearly enough shit getting in the way of other players in Raids.

5. Sony Walkman Series A

Price $399 **Website** www.sony.com.au

The Walkman – the ubiquitous mobile entertainment device that has given us not only years of listening pleasure, but also the fantastic Wired for Sound video by Cliff Richard. If you want a super treat, check it out on YouTube.

Oddly enough, the Walkman continued to be popular even after Cliff's vocal stylings, and now Sony's brought out the latest contender, the A Series. It's a slim MP3 player with an OLED screen, and comes in 16GB and 32GB models. It even has noise cancelling headphones, so you can be part of a major traffic accident!



The solace of quantum

Jake Carroll gets mathematically spooky in his quest for the future of computing.

This month's X-Ray is unapologetically really small and cold. We're not talking about the cult of the really-small-cold-people living under the bed of iamthemaxx however, but something much more exciting.

We're looking at quantum computing. What it means, how it works, and the greater implications it has on how we'll be computing in the future. Put a lab coat on, load up on energy drinks and find yourself a sweet new graphing calculator – we're hitting the lab.

Bad 90s sci-fi television

Never mind the computing bit. The quantum part of things is complex enough. A quantum is the minimum unit or measurement involved in an energy interaction. In a sense, a quantum is the idea that the physical property of anything can be quantised. This means that the value of a physical property can only take on a discrete value, rather than any continuous value at all. It's the very smallest amount of a physical property that a system or environment can posses.

To add computing to this complex concoction, a quantum computer is one that takes advantage or makes use of quantum phenomena to perform operations on data.

In understanding a quantum computer, we need to lay down the basics of a normal binary computer first. In conventional computing, we've got 0s and 1s as representations of bits. These 0s and 1s form patterns within memory and registers to form useful calculable and processable data. In a quantum computer, we use qubits – or quantum bits, instead.

The difference between a bit and a qubit is the states they can reside in. A bit is akin to a car ignition key. It's either 0, for off, or 1, for on. For a qubit, the value may still either be 0 or 1, but critically, it can also be 0, or 1, or a combination (a superposition) of both. This concept of something with two values also having the potential other 'mixture' state is a matter of probability and Heisenberg's uncertainty principle. The power and raw capability of a quantum computer is buried within this ability to exist in many states, or be calculating in multiple states at once. Think about it as being the difference between a single core, single threaded CPU processing an instruction, compared to a dual core dual CPU processing two instructions simultaneously, then think about its ability in a quantum representation of this at an atomic level, where every atom has the power to compute an instruction in one of these multi-state suspensions in parallel. No need for extra cores – you get all that parallel state processing for free, thanks to the power of the universe!

There's a cat involved!

There isn't much better than lounging around the house on a Saturday morning, taking snap shots of your cat doing stupid things, then posting them on the Internet. Caturday, as it has been dubbed by the masses. As it turns out, cats are pretty good at explaining quantum theory as well.

To better explain the quantum phenomena (entanglement and superposition) that make all this work, we're going to use an old quantum adage known as Schrödinger's Cat.

Let's say you've got a cat in a sealed box. You can't see inside the box. Inside said box, with the cat, is a poisonous gas that is somehow contained. Unfortunately, kitteh got curious, and released the poisonous gas. Now we're in a state where the cat is either dead (0), or alive (1). Until the point where we open the box to find out exactly what happened, the cat itself is notionally both dead (0) and alive (1), in that it can exist in both states. This is known as a superposition. The superposition effect is destroyed when we open that box, however, because the 'measurement' of it makes a statement that confirms either 0, or 1 – but not both (because that would be impossible, outside of quantum theory).

The theory extends a bit further to explain entanglement. If we've got two boxes, and two cats, and we open one of them, to find a cat alive, we can state that the other cat is by definition alive too, even if that second box is never opened.

Herein, some of the computing power is unleashed through quantum theory. Because we have the ability to influence a system or algorithm dynamically, without changing an entire environment, complex calculations can be returned or computed far quicker than with a conventional binary methodology. You might call it 'true' parallelism in a sense. It's not stuffing

things into pipelines, and farming threads off to separate cores. It's really doing things (where a 'thing' is a discrete workload) at a physically simultaneous level.

Building a quantum computer

So we've now got a very superficial handle on what a quantum state is and what quantum phenomena are composed of. Why can't we just go and build a quantum based computer? To answer that, we will investigate how they are constructed and engineered to begin with.

The complex states in which quantum computing can exist are currently only calculable and attainable in a laboratory environment. The reason these states are only observable and controllable in a laboratory environment is because of the nature of atomic (and sub atomic) interactions. Think tiny. *Really* tiny.

A way to represent these really tiny states, and the previously mentioned ability to exist in multiple states simultaneously is to use a Bloch Sphere. Check out Figure 1 for a reference point.

The pairs of antipodal points on the Bloch Sphere represent the pairs of states of a particle. These pairs and their 'neither here nor there' existence represent spin-up and spin-down. It is these pairs, as the formation of a qubit that are the building block of the quantum calculation, and ultimately, the quantum computer.

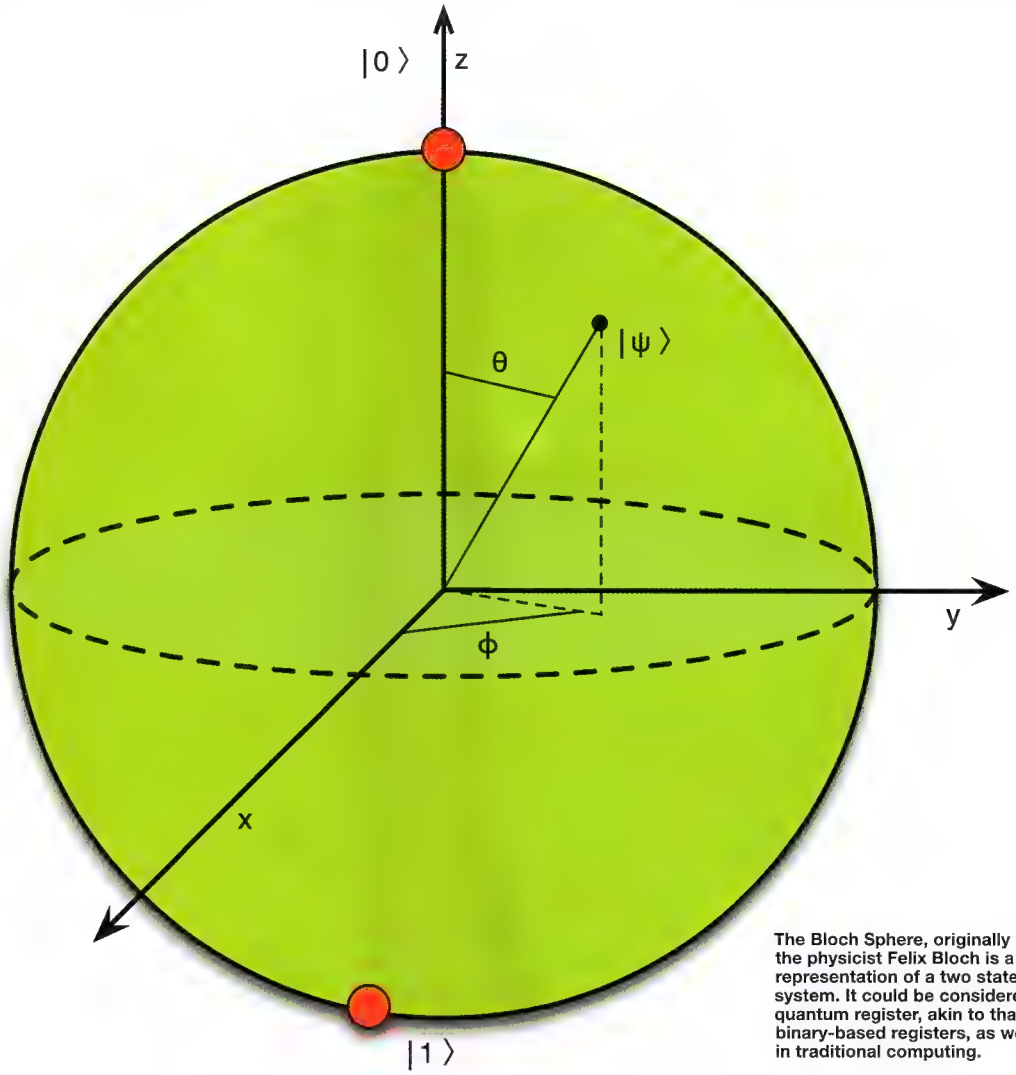
By now, you've gotten the hint that a quantum system works on an atomic scale. To isolate atomic particles and make them do as we wish (and perform calculations with them), there are several mechanisms in place that quantum-computing engineers and researchers are using.

- Ion traps – an optical or magnetic field to trap ions.
- Optical traps – using light to trap and control particles.
- Quantum dots – semiconductor based materials that can contain and manipulate electrons.
- Superconducting circuits – allowing electrons to flow with virtually zero resistance (and then to be corralled) at extremely low temperatures.

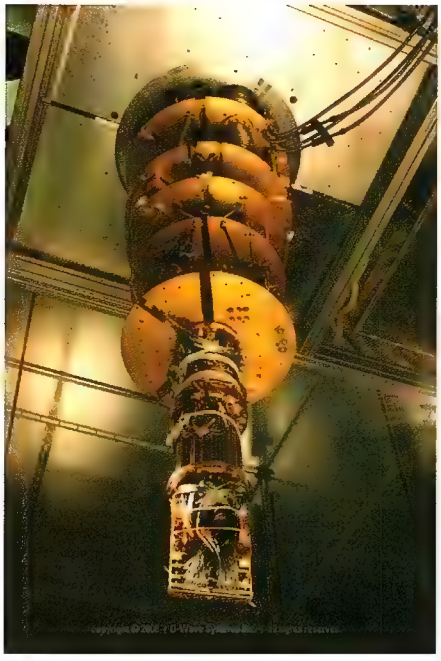
In the most pure form, most of the quantum computers in existence only manipulate between 16 and 384 qubits, with the majority of the experimentation taking place being purely theoretical. This being said, there are several quantum devices capable of 'computing' being engineered and tested around the globe.

Perhaps the closest the world has come to a marketable, reproducible and ready-engineering quantum computing solution are the superconducting processors from the company D-Wave. The approach D-Wave or 'The Quantum Computing Company' has taken in engineering a superconducting microprocessor is one of algorithm intelligence. The core engine theory is to be able to compute adiabatic quantum algorithms. The concept of an adiabatic algorithm is deeply rooted in a branch of physics known as Hamiltonian mechanics, which involves known ground states, where the total amount of potential and kinetic energy of a quantum system can be used to understand or describe solutions to problems.

In an adiabatic algorithm, a quantum system subjected to gradually changing external



The Bloch Sphere, originally named after the physicist Felix Bloch is a physical representation of a two state quantum system. It could be considered a 1-bit quantum register, akin to that of our binary-based registers, as we know them in traditional computing.



Keeping a quantum computer at the exact environmental point at which calculations can occur is an extremely significant infrastructure challenge.

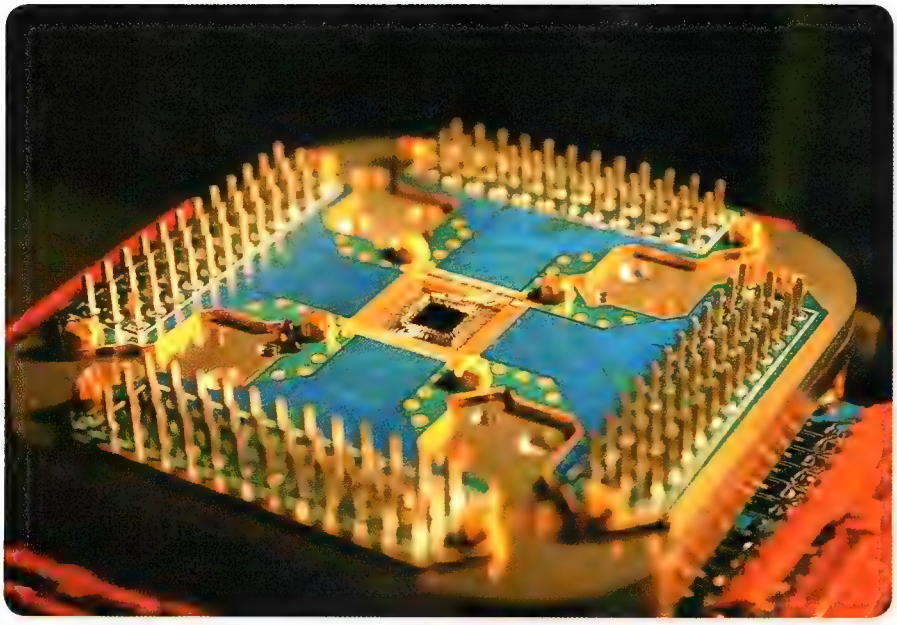
conditions (the movement or modification of a qubit in a register to perform a calculation, for example) has the ability to adapt its functional form if changes occur slowly enough.

A real world, physical example of this is a simple pendulum rocking back and forth in a vertical plane. If somebody comes along and moves the support for it, the oscillation of the pendulum rocking back and forth will change. If the support is moved sufficiently slowly, the motion of the pendulum object relative to the support will remain unchanged. A gradual change in conditions allows this system to adapt, and as such, it retains initial capabilities, performance and character. This is the core explanation of an adiabatic quantum process.

D-Wave's new shiny beast is capable of 128 qubit manipulation – stored on 128 superconducting niobium loops as either clockwise or anticlockwise current, representing 0 or 1 – or as a qubit with both currents at the same time in a quantum superposition. When processing is required, the niobium-based qubits are manipulated and configured using a magnetic field.

It's one thing to build a niobium-spinning magnetically-shielded device... but it's another entirely to keep the environment stable

It's one thing to build a niobium-spinning magnetically-shielded device that has the ability to focus the spin of any given ions around an atom, but it's another entirely to keep the environment around it stable for the purposes of useful calculations. Much of the time, extreme cooling requires significant energy sources, and on top of this, isolated (conventional) computing control facilities.



A quantum die, sitting inside a highly conductive precision engineered housing.

Colder than a Yeti at an ice cream shop

To make it all tick, things have to be kept cold. Near 20mK cold (millikelvins), which roughly translates to -273.1°C or 0.02 degrees Celsius above absolute zero. The entire system needs to be this cold. The reason these systems need to be kept so cold is a result of energy control and stability. Where ions of certain conductive materials are concerned, without almost absolute zero temperatures (where all atomic and sub atomic interactions in theory 'stop' or come very close to it), the states of superconductivity and super fluidity cannot be exhibited or observed (primary quantum effects). The situation that arises when external factors in the environment irreversibly alter the quantum state attempting to be obtained is known as quantum decoherence – and it is the bugbear of quantum computer engineering groups.

In putting together the 'mainboard' of a particular type of quantum computer, the actual logic gates, integrated circuit and what we'd consider a conventional core or die are sunk into a highly conductive outer shell, which is then pushed into a metallic casing and tightly sealed.

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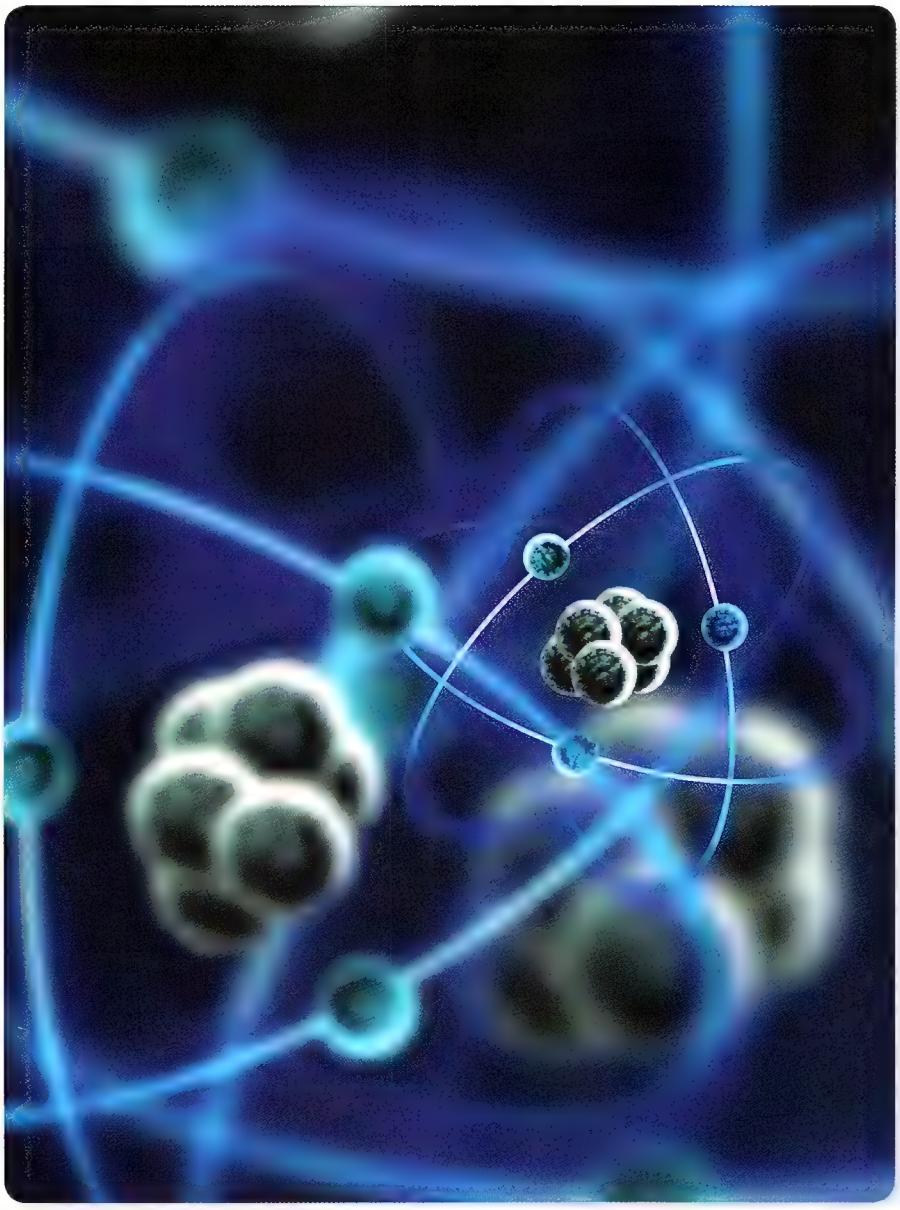


Once the die is sitting in place, it is bolted to a control system, where current, magnetic forces, cooling, remote sensing and telemetry can be plugged in to interface with the core. This is then in turn housed inside a refrigeration unit and cooled progressively to within the operating limits and thresholds required for quantum effects to take place with the target material in use.

Practical applications

Currently, it's all a little esoteric. Still in the realm of theory, complicated hardware rigs and large-scale laboratories custom designed to house such devices. The calculations being carried out currently are trivial, akin to that of a child with an abacus. It is however, the seemingly limitless possibilities of efficiency that make quantum computing so tantalising. Around thirty years ago, Richard Feynman told an audience at MIT that a quantum computer could be as powerful as nature itself, in what it was capable of simulating. Up until now, we've not been able to realise this.

Cryptography is obviously begging for quantum computing treatment, with the complexity, cipher lengths and encryption methods being used every day also being trailed by ever increasing computing power. With a leapfrog situation occurring on the digital security battlefields every other month (as encryption and cryptographic techniques get stronger, then CPUs and the computational capability to break them become more significant), the ability to 'simultaneously compute' at an atomic level using the power of superposition and entanglement could change the way we think about security if only for the speed at which we might be able to deal with things.

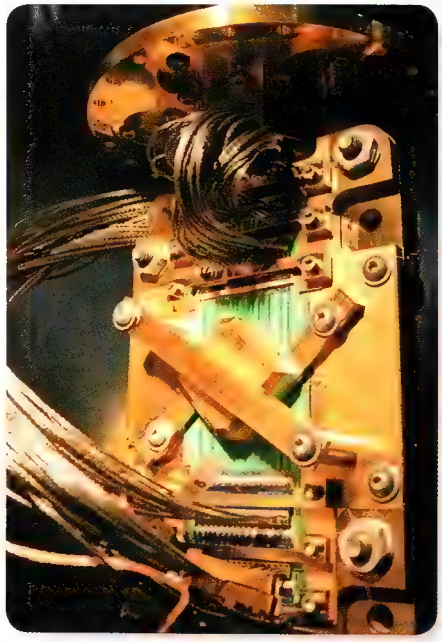
On the more human side, we have geneticists and bioinformaticians struggling to keep up with the computational requirements needed to drive their DNA sequencing and resequencing systems, in order to fish through genome data that we now have the ability to generate terabytes and terabytes of, daily, in our own labs. Quantum computing could provide us with a way out, as a means to analyse this data with much more efficiency and capability than in a traditional binary computing model.

These are tip-of-iceberg style scenarios that have been bandied about by the quantum computing community for around two decades now. Unimaginative possibly, because we still don't quite have a handle on just how we're going to scale up, scale out, or keep a tightly controlled enough environment for a quantum system to work correctly in.

The calculations being carried out currently are trivial, akin to that of a child with an abacus.

Coming back out of the lab, and back down to earth – we need a reality check. True to the nature of the Church-Turing thesis, quantum computers don't allow us to compute functions that are not theoretically computable. They only increase the efficiency of how a computer operates.

We might be on the wrong track entirely – but we'd rather be uncertain than give up on innovation entirely.



The quantum interface card, and core/die sitting in the middle of the unit, bolted to conductive, precision engineered hardware for telemetry, control and manipulation. This whole set of components is dipped into a refrigeration tank for cooling before operations can take place.

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What's on your drive?

Ashton Mills takes us on a tour of his second brain...

I've lost count of which system this is, or how many I've built, but with the exception of old games and the odd buried forgotten directory, I copy all the contents from one system to the next, year after year, age after age.

So my drive, or drives, are a window into present and past. Some ten years worth in fact, though it would have been closer to twenty, had the Franken-RAID not occurred (see 'Ah, F**K', Atomic issue 15 April 2002). Ah, the Franken-RAID. Your life was short, but oh so bright.

But if you look, what would your drives say about you? Our computers are more than just tools, but an extension of us. It's a good question, so I delved into the depths of my drives – and here are but the highlights.

The oldest file: is actually a Technica Obscura column, how fitting, from nine years ago. Newest file: this document being worked on :)

Most eclectic are my savegames, from games present and past, even those I don't even have any more. There are too many to list, but they sit there, a vestige of past experience and hundreds of hours contained in a little file that I can't bring myself to delete.

Musical taste says a lot, and my collection includes not just loads of 80s but even... Commodore64 music! And hey, not just in SID form, but modern remakes by bands like Press Play On Tape. I know, I won't swoon any girls with this lot, but boy do they bring back memories: Wizball, Parallax, International Karate and more. I'll try and save some face: my most recent music files? Rips from CDs by Muse and Royksopp.

And there's TV, of course. I'm still slowly converting Babylon 5 from DVD as per X-Ray issue 104, but there's also some Anime including Black Lagoon, Cowboy BeBop, and Samurai Champloo. Watch them, you won't regret it.

Photos are scarce, but I have lots of screenshots – the oldest perhaps happy snaps from Everquest, my first MMO. Shots from Counter-Strike, Frontline Force, and Natural Selection too. I even found top-down map views with painstakingly drawn strategies for clan matches. And a trophy shot – pwning Flayra, the designer of Natural Selection, as a humble Gorge with healspray from when I was a playtester. Might come in handy one day.

> ...they sit there, a vestige of past experience and hundreds of hours contained in a little file that I can't bring myself to delete.

The most common files, created by me at least, are plain old text files. There's hundreds scattered across my drives – benchmark results, notes for work, to-do lists and reminders to myself: write a book, says one. Catch up with friends, says another. I'm particularly bad at getting around to both. There's poetry, to a girl long forgotten. Short stories, mostly sci-fi and the fantastical. And quotes in a file, ostensibly so I would remember them: "There is more to life than increasing its speed" and "The price of anything is the amount of life you exchange for it". The first is Gandhi, the latter unknown. But I can see why I kept them.

Random stuff – in one directory a collection of 10,000 spam emails, which came in handy for a spam-filtering test. In another, The Uber Linux Box Project in HTML form. And in another a picture of me and Dr Karl at the first Atomic Live. I think I still have that shirt! Wait, maybe that's not a good thing.

Modding files take a good chunk. From BIOS files for motherboard and GPU, to Mart's Monster Mod for Oblivion and Mart's Mutant Mod for Fallout 3 (each of which took a year of my life to do. Hmm, what did those quotes say again?)

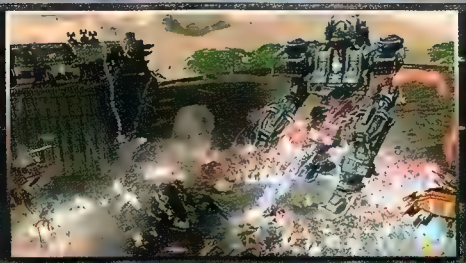
And much of this, though not all, is backed up onto another hard drive in the machine, as well as on a NAS, for there are three certainties in life: death, taxes, and losing your data right when you least expect it.

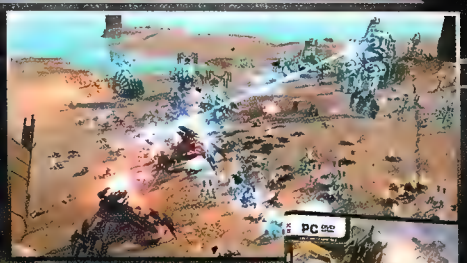
So that's a little of what's on my drives, a snapshot into my life. What's on yours?

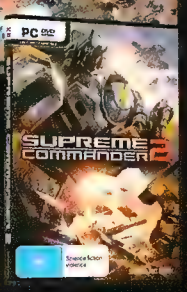
No, seriously – he really does want to know!
amills@atomicmpc.com.au

SUPREME COMMANDER 2

THE BRAVE WILL FIGHT, BUT ONLY HEROES WILL COMMAND







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I/O OF THE MONTH

Shoot a policeman today!

I As a licensed electrician, I thought I would bring to you attention some legal and safety issues I saw quite regularly in recent issues of Atomic. It is ILLEGAL for an unlicensed person to work on any mains voltage wiring and or equipment. It is also bloody unsafe; your advice in these articles will get somebody killed.

Comments in the advice columns like the fourth paragraph of the reply on issue 108 page 16 [about wiring up an extra mains exhaust fan] are TOTALLY WRONG and the reader will by following this advice potentially kill somebody. FYI the earth is required on metal framed equipment to enable a fault current path so protection devices trip before somebody touches the equipment and they become the fault current path (obviously not very good for the person).

Please for the sake of a great magazine stop offering any advice on how to stuff around with mains voltage equipment as I would hate to see some parent sue your magazine because their dead kid took the advice printed in its pages.

Sebastian Reddan

O Electrical 'installation' work – essentially, permanent wiring, or wiring that should have been permanent but kind of isn't because some genius decided to bury his own extension cord between the house and the garage – may not legally be performed in Australia, or in many other countries, by anybody who doesn't have the appropriate electrical license.

But *non*-permanent electrical wiring is perfectly legal for unlicensed people to do in Australia, and in a long list of other countries. Pamphlets about safety switches and such always say that 'electrical work' must be done by a licensed electrician, but they're only talking about permanent, wall-ceiling-floor-and-breaker-box, wiring. Otherwise almost everybody who builds a mains-powered kit out of Silicon Chip would be breaking the law.

This doesn't mean that fiddling with things that plug into the wall is something that should be taken lightly, or done as your very first venture into the wonderful world of electricity, as I invariably point out whenever this subject comes up. I've also taken pains in the past to point out the non-obvious ways in which people who don't know what they're doing can shorten their lives and/or invalidate their home insurance if they decide to wire up their own wall-sockets. Or even if they only, perfectly legally, attach their own plug to the end of an electrical cord, or try to change a fuse:

www.dansdata.com/danletters128.htm#2
www.dansdata.com/danletters123.htm#4
www.dansdata.com/io079.htm#2

I've also explored the ways in which sensible electrical advice from someone in one country can be dangerous and/or illegal in others:

www.dansdata.com/danletters190.htm#2

...and the many and varied other ways in which you can kill yourself with electricity. Or unexpectedly survive.

www.dansdata.com/danletters102.htm#3
www.dansdata.com/gz013.htm

With regard to earthing things: There's an earth-lug-bolt hole in many standard mains-powered fan frames. But the only time I personally have ever seen such a hole with the paint cleaned off it and an earth lug screwed on is that one time when I did it myself, to the fan illustrated in that letters column, which was going to sit out in the open air on the back of a computer case.

I'm sure *some* gear that contains this sort of fan makes use of the earthing point. But every time I've seen such a fan, it's been in something that had the earth wire from the mains cable terminated somewhere more convenient on the chassis, not on the surround of one random fan.

It's less safe to leave a mains fan stuck on the back of a PC un-earthed than it is to earth it, but if you bolt it onto the back of a metal computer case with metal fasteners then it'll share the computer's own earthing (provided the PC's plugged into the wall, of course; having two power cables going to one box creates some more of those non-obvious hazard situations). For a bit more safety again you should of course install the fan *inside* the case, not hang it off the back panel. You could even connect it to the IEC receptacle on the PSU, and do away with the inelegant dual-power-cord setup so familiar to Atomicans who find themselves making two-PSU systems or water-cooled PCs with mains aquarium pumps.

But in either of the add-on-mains-fan situations, the add-on fan is probably going to be safer than a $15 fan heater from your local discount store. And in neither situation is it, as far as I know, in any way illegal.

(Sebastian replied, unpersuaded, and told me to look at, to pick one example, page 22 of the Queensland Electricity Safety Act, PDF at **tinyurl.com/y8r84c2**. I then pointed out that the very *next* page said, quite clearly, that you don't need a license to work on things that plug into a wall socket. It may be unwise, but it is not illegal.)

I/O OTM

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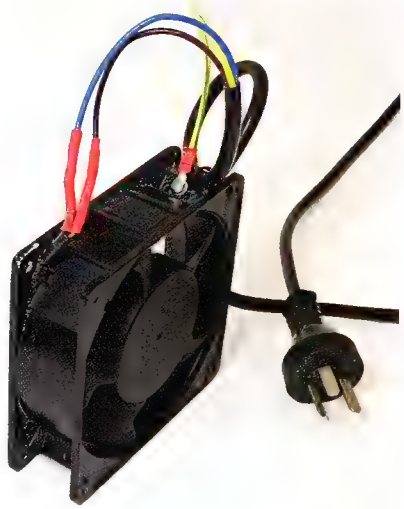


"Wiring up you own mains fan: Threat, or menace?"

Frackin' fragmentation

I What disk defragmenter should I use?

I know that magnetic drives aren't cool any more, but the backups of important multimedia files that I'm providing as a free service for entertainment corporations are way too big for SSDs. And what with downloading and archiving and moving stuff around, I don't trust the Vista defragmenter when it tells me that I "do not need to defragment at this time".

There are always big blocks of data that the Windows defragmenters can't move, anyway. Perhaps the drive really does need to be defragged, but the Windows thing can't DO it, so it says there's no need?

I remember you writing before about how some people have had a defrag fetish ever since they were wearing out their huge 2GB drive in Windows 95. Is it still as pointless as it was then? Do you defrag at all? If so, what do you use?

Jack Laidler

O I don't defrag very often. There are certain pathological cases where a monthly, or even more frequent, defrag can actually be a good idea, but a drive full of TV-and-movie video files is not one of those cases. Yes, you may end up with a 700Mb file that's in 25 pieces scattered across the drive, but you're not leaping from one part of the file to another 20 times a second, so 25 ten-millisecond seeks in the process of watching the movie will make no difference to anything.

For similar reasons, defragging the registry and swap file(s) is very unlikely to make a perceptible difference. (Except for the kind of difference that you perceive, but which does not actually exist.)

If you're *editing* digital video, on the other hand, then you may well be scooting all over the drive, randomly accessing more than one gigantic video-stream file simultaneously, plus a sizeable audio track or three. In this case, a drive that always has a few projects-in-progress on it can end up pretty impressively fragmented. This can cause noticeable choppiness in the editing software.

(Defragging a huge drive can take a long, *long* time, though. Many pros just format their data drives between projects.)

The not-very-secret truth about Windows disk defragmenters is that most of them do much the same thing as the defragger that comes with the operating system. This is because many different defraggers use the same built-in Windows defrag API. So they may let you pick which individual files you want to defrag, or provide subtly different optimisation modes, but the biggest real difference between them is their presentation of that most mesmerising of pointless technological displays, the defrag-status graphic.

If you insisted I recommend one particular Windows defragger, it'd be MyDefrag, a frequently-updated program which was called JKDefrag until early 2009.

I like MyDefrag partly for its simple interface, and partly for its magnificently resizeable status window, which looks completely hilarious on a 30-inch monitor.

Have you considered tattoos?

I I've got gigs of precious family photos and videos on my PC and was thinking of buying a couple of hard drives because they are so cheap right now, copy the files onto a drive (or two), then packing the drives back into their static bags and into storage.

Will they be as safe or safer than just burning all the files to DVD and storing on that medium?

Chris Kamppi

O Nobody really knows how long data will last on any storage system.

Manufacturers of hard drives and flash RAM and writable optical discs can try to accelerate normal aging processes by applying heat and UV light and so forth, and they also know the basic physics of the different storage media. Putting this data together gives us decent confidence that a current hard drive or Flash RAM device should retain its data after at least five years on the shelf, and quite plausibly ten. Good-quality –writable DVDs ought to be OK for easily that long too, as long as you store them somewhere cool, dry and dark. The fancy gold/phthalocyanine 'archival' CDs and DVDs should last several decades, if properly stored.

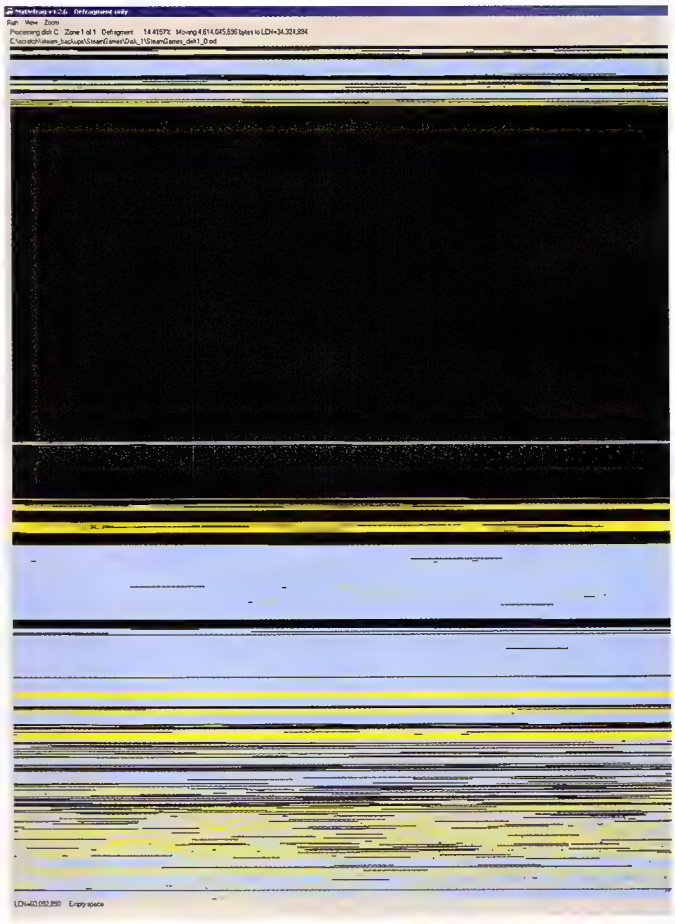
But any storage system may still have some lifespan problem that nobody's thought of. It's impossible to truly simulate what'll happen in even a highly controlled environment, like a bank safe-deposit box, without actually putting your storage device in that environment and waiting.

Fortunately, it's not very hard to compensate for this uncertainty, and the parallel problem that even if a hard drive or USB stick is perfectly functional 15 years from now, it may then be difficult to connect it to a computer.

The solution is to make as many copies of your data as is practical. So, put your backup on a new cheap hard drive, and on that old 80GB one you aren't using any more, and at least the more important stuff on DVD-Rs and/or Flash drives, too. And continue to copy the data onto new storage systems as they become available.

Shifting backup data from old small hard drives to new big hard drives, and from old CD-Rs to new BD-Rs, et cetera, requires you to copy more and more data as your data set gets larger and larger. But because storage keeps getting bigger and faster and cheaper, the *time* you spend moving data around per year may actually *fall* as the years go by. The amount of money you have to spend on backup devices each year is practically certain to fall.

You probably won't have to spend any money on backup software, either. Excellent packages like Cobian Backup and DriveImage XML are freeware, and the standard backup utilities in Windows 7 and, yes, even Vista, are actually quite good.



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What are the best value upgrades?

Mark Mackay takes two vintage PCs and shows which upgrades improve their performance the most so you can get the most from your budget.

Whether it's wanting to play a new game, realising that you don't want to put up with Windows grinding away for so long when you turn on the PC, or thinking that editing photos and video ought to be quicker and snappier, there are many reasons to upgrade your PC. The problems, of course, begin when you try to figure out what the upgrade should be.

If you want to play new games, should you buy a new graphics card? Or would a faster CPU help? Should you split the budget between both? If you want to achieve multiple objectives – faster boot times and faster games – these complexities only multiply. A complete overhaul is a constant temptation, but it isn't always financially viable. Over the following pages, we'll show you the elements to take into consideration to ensure that you make the right choices, and achieve the greatest performance boosts for your upgrading funds.

ASSESS YOUR OLD PC: KNOW THY RIG

The first step in any upgrading process is to obtain a good idea of which hardware is currently in your system, and the tasks that it's capable of performing. Most Atomic readers will have built their own rigs or specified exactly what goes where when buying from a system integrator, but if it's been a few years then we'll forgive you for not knowing exactly which motherboard you have or the SPD timings of your memory.

If you're unsure about what's lurking under the side panel, here's how to check. Download CPU-Z (**www.cpuid.com/cpuz.php**) to check your processor and memory specs – all the relevant information is on display after double clicking the executable. To check which graphics card you're running and how much on-board memory it has, there's a similar app called GPU-Z (**www.techpowerup.com/gpuz**).

If you're unsure about which model of motherboard you have, never fear, since CPUz comes with a built-in tab called 'Mainboard' that should tell you exactly what you have. If it doesn't work, then you'll have to either dig out the box and manual, or pop off the side panel. Almost every motherboard manufactured this side of the birth of Jesus will have its model number printed on the PCB. You can then head to the manufacturer's website to find out more details, such as the number and speed of SATA ports and PCI-E slots. Armed with this information, you'll have a good idea of the basics of your PC. This information will help you to figure out which components will be compatible with your existing PC.

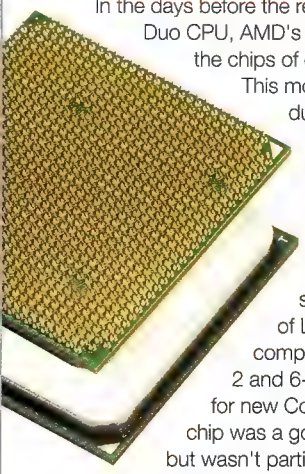
It will also be helpful to take a look at your PSU; while your motherboard might have eight SATA ports and four full-length PCI-E slots, you won't be able to fill all three slots if your PSU has the all the strength of a glass of water. There should be a large sticker on the side of the PSU that's visible when the side panel is removed (if it isn't there then it should be on the other side, and you'll need to remove the other side panel). This will list the model of the PSU and show a breakdown of how it provides power over various voltage rails. In terms of upgrades, the most important rail(s) to look at are the 12V rails, as these supply the CPU and GPU. If you're planning on fitting a lot of new hard disks, you should also look at the power provided by the 5V rail. Somewhere on this grid (usually the bottom line), you'll see the PSU's total wattage, which can also be a useful figure to have in mind.

Throughout this feature, we're going to install a variety of upgrades in two old PCs – one with a spec dating from around 2004, and one from around 2006.

CIRCA 2[illegible] THE AMD SYSTEM

THE CPU

2.2GHz AMD Athlon 64 X2 4200+



In the days before the reign of the Intel Core 2 Duo CPU, AMD's Athlon 64 chips were the chips of choice for overclocking. This model is a Socket 939 dual-core CPU.

In terms of clock speed, it isn't hugely slower than contemporary CPU, but the small amount of cache it has is striking; there's 512KB of Level 2 for each core, compared to 256KB of Level 2 and 6-8MB of Level 3 cache for new Core i5 and i7 CPUs. The chip was a good all-round performer but wasn't particularly power-efficient.

It's also worth noting that this CPU uses a 200MHz HTT speed, which will have an impact on the memory it uses.

Socket 939 CPUs aren't sold new any more, so you'll need to hit eBay to find one – the fastest model was the FX-60, clocked at 2.6GHz, which isn't much quicker than the 4200+ we already have.

THE MOTHERBOARD

Asus A8N-SLI Deluxe

The Asus A8N-SLI Deluxe is arguably one of the greatest motherboards of all time and was the ultimate in enthusiast motherboard manufacturing around four years ago. It has dual full-length PCI-E slots and an Nvidia nForce 4 SLI chipset, so it can run two cards in SLI. It also has a well laid-out BIOS, which has since become a well-loved characteristic of Asus motherboards. It has four DIMM slots, supporting a maximum of 4GB DDR memory. It takes Socket 939 CPUs and has eight SATA ports. Scrutinising the specs list online reveals that only four of these support SATA 3Gbps – the other four are powered by a SATA 1.5Gbps Silicon Image controller, which will be worth bearing in mind when we upgrade the storage later on.

If you want to upgrade to a new Socket 939 motherboard, you won't find many better boards than the A8N-SLI Deluxe. In fact, as far as we're concerned, there was only one - the DFI Lanparty UT NF4 SLI-DR Expert. It was a superlative overclocker and would help you to get the most out of your CPU. However, it can be pretty hard to get these days, so you'd need to trawl eBay for one, and when we looked, there weren't any available. A couple of online stores say they have one, though, so who knows.

Still, you'll be able to update the storage, memory and graphics card with no problems from the motherboard.

THE GRAPHICS CARD

Nvidia GeForce 8800 GTS 320MB

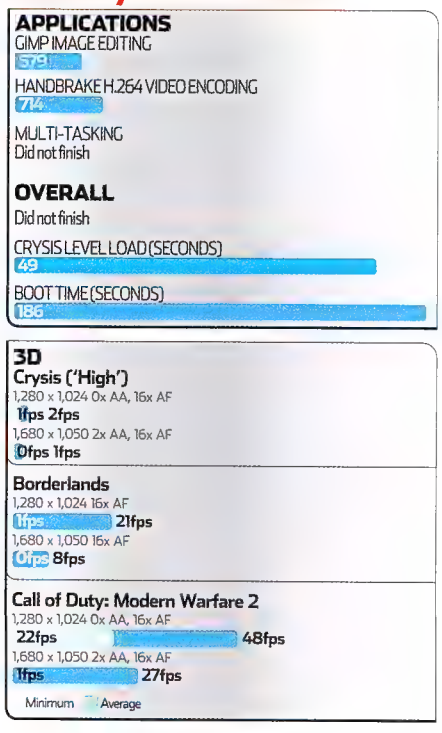
The performance jump from Nvidia's GeForce 7-series to its GeForce 8-series was immense. The GeForce 8800 GTS 320MB was an affordable access point to the awesome G80 architecture. Although these graphics cards debuted in 2006, a year or so after the motherboard and CPU in this example rig, it was an extremely popular choice for a first DirectX 10 graphics card. However, three years on, the 8800 GTS – unlike the freakish GeForce 8800 GTX – really shows its age in modern games, and definitely needs improving.

THE MEMORY

512MB Crucial PC-3200

While 512MB now seems like a paltry amount, back in 2004, 1GB was a premium option and to save cash, 512MB was certainly doable. As the CPU has a 200MHz HTT, our old system has PC-3200. This refers to its bandwidth, and is also known as DDR 400, as it is dual data-rate memory running at 400MHz, twice the 200MHz system bus. The motherboard

AMD System Results



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has four slots and can cope with a maximum of 4GB of memory, so it should be easy to upgrade, and you can still buy new DDR memory. As with parts for a classic car, though, the limited supply of DDR memory means that it's quite expensive now.

THE POWER SUPPLY

Seasonic S12 500W

The Seasonic S12 500 stuck around for many years following its launch. It's a 500W PSU with two 12V rails – one 17A and one 16A, with 30A split between 3.3V and 5V rails. It also has two 6-pin PCI-E power connections, so it will be able to power a new graphics card such as a Radeon HD 5870. It's also quite efficient at 82 per cent, so it won't waste much electricity. If you have a lesser PSU in your old PC, it may be contributing to higher power bills by drawing lots of power from the wall in order to provide your PC with the power it requires to run.

THE HARD DISK

Seagate Barracuda 160GB 7200.9

Seagate's Barracuda 7200.9 model is a suitably average SATA hard disk, and its 160GB capacity seems tiny these days.

THE HSF

Arctic Cooling Freezer 64

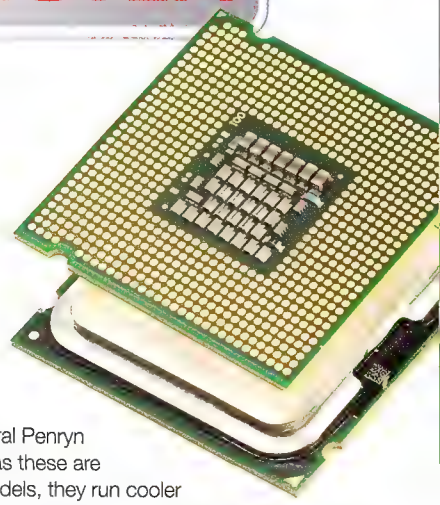
One of the most legendary pieces of kit ever to graceour labs, Arctic Cooling's Freezer 64 was the ultimate in bang-for-buck cooling. There were more powerful coolers out there, but if you wanted to get maximum overclocking potentially using air cooling, it would invariably cost you a lot more cash. You can still buy coolers compatible with Socket 939, although to cool a dual-core CPU, an upgrade to a Freezer 64 is probably overkill.

THE CHASSIS

Cooler Master Stacker 810

The Cooler Master Stacker is a huge case that provided a shed-load of space for upgrades, decent cooling and good build quality. It was also the only case of its day that was capable of housing a 240mm radiator without developing an intimate relationship with your Dremel. Given that graphics cards have grown to prodigious lengths, its size should stand us in good stead.

CIRCA 20 THE INTEL SYSTEM



THE CPU

2.13GHz Intel Core 2 Duo E6400

The E6400 was one of the first Conroe Core 2 Duo CPUs manufactured on a 65nm process. These were the chips that proved Intel could do a heck of a lot better than the disappointing Pentium 4. The 2.13GHz E6400 could be overclocked well in excess of 2.66GHz, the stock speed of the high-end E6700, which was more than double the price. Coupled with the massive step up in performance represented by the Core 2 Duo architecture, it offered epic performance at a reasonable price.

The E6400 uses a 1,066MHz bus (266MHz, multiplied by four, as it's quad-pumped), and it's an LGA775 CPU, a socket that Intel only recently moved away from, so a CPU upgrade will be possible in this system. However, Intel is fond of tying motherboard upgrades to CPU upgrades, so you need to check which CPUs your motherboard supports if you fancy upgrading your LGA775 CPU.

THE MOTHERBOARD

Asus P5B Premium

If the Asus A8N-SLI was the best motherboard ever then the Asus P5B Premium is the board that came the closest to taking that title. It was an excellent overclocker, with copper heatsinks for core components and a well laid-out BIOS, and provided connections for your every hardware-related requirement.

The board is based on Intel's P965 chipset, which supports (with a BIOS update) a wide range of Core 2 Duo and Core 2 Quad CPUs, including the mighty Core 2 Quad Q6600 and several Penryn models; as these are 45nm models, they run cooler and are great overclockers. The Asus website has a full list of supported CPUs.

The P5B has four sockets for DDR2 memory,

supporting a maximum of 8GB of memory. It has six SATA 3Gbps ports, and two full-length PCI-E slots. While it supports ATI CrossFire, the second slot will have 4x PCI-E lanes, so it isn't worth adding a second graphics card.

THE GRAPHICS CARD

Nvidia GeForce 8800 GTS 320MB

Just like our AMD system from 2004, our Intel system was also bequeathed with an 8800GTS 320MB. While its performance in games was great for the price at the time (and certainly made the likes of the 7800GT look slow), it's struggling with most games released after 2008 at high-ish settings. It can be relegated to another system to be reused; but it needs replacing.

THE MEMORY

1GB Crucial PC2-5200

The E6400 uses a 1066MHz FSB, which runs at 266MHz, multiplied by four, as it's quad-pumped. This means that it needs memory running at 266MHz, so the minimum we're looking at is DDR2-533, also known as PC2-4200. Our old system has PC2-5200; this is the next speed bump up (it's 333MHz memory), which allows for easier overclocking, as there's headroom for greater speed. Three years ago, before the arrival of Vista, 1GB was a reasonable amount of memory, but for Vista, Windows 7 and modern games, 2GB or 4GB is far more preferable.

THE POWER SUPPLY

Enermax Infinity 650W

After the Enermax Galaxy with its 1kW output made a name for the company, the Enermax Infiniti 650W was the perfect mid-range follow-up. It's a modular design, so you can keep the cables tidy and have effective airflow, but you'll need to remember where all the cables are when it comes to upgrading. The Infiniti is a 650W PSU with three 12V rails, two of which are rated at 28A, with the third at 30A. It has two 6-pin PCI-E power connections and a third 6/8-pin one. If you have one of these, or a similar-wattage PSU, then you'll be in good stead to upgrade to a quad-core CPU or modern graphics card.

THE HARD DISK

Seagate Barracuda 160GB 7200.9

When this system was built, storage wasn't high on the list of priorities. Times change, and this drive is looking pretty puny.

THE HSF

Arctic Cooling Freezer 7

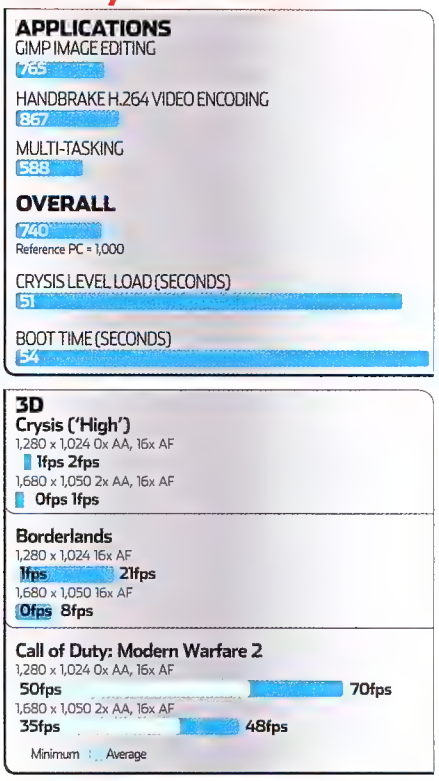
This is the LGA775-compatible version of the Freezer 64 that we used in the AMD rig. The push-pin system flummoxed us when we first encountered it, but after a little experience, we learned to hate it even more. That said, the cooler in question is solid in terms of performance. Much like the Freezer 64, it wasn't the most powerful CPU cooler on the market, but it offered the best value for money by an Arctic mile. The Freezer 7 was the clear choice for our Intel test rig. As LGA775 has only recently been superseded, the majority of new coolers still include compatible mounting systems, so you'd be able to upgrade, or add a quad-core CPU.

THE CHASSIS

Antec Nine Hundred

With its trusty beverage holder on the top and more importantly, 200mm roof fan, the Nine Hundred was the first in a long line of high-airflow chassis from Antec. We saw the case in the same issue as the first generation of Intel Core 2 Duo CPUs and we've no doubt that many readers bought the chassis to get the maximum overclocking potential from their shiny new Intel CPUs. It lacked the cable management features that would be standard in a modern Antec case and the curves weren't quite FHM material, but in terms of cooling ability, the Nine Hundred was hard to beat. Even by today's standards, the Nine Hundred's airflow is excellent, so it will easily house modern hardware without creating overheating issues. Space might be an issue with long graphics cards, however.

Intel System Results



UPGRADE Memory

Memory can be a tricky topic, as prices vary from month to month, and measuring the performance difference between DIMMs is a difficult and dicey affair. Memory performance is intricately tied to that of other system components, too – particularly your CPU and whether your system is overclocked, so to make like-for-like comparisons between modules, you often end up using synthetic benchmarks, or real-world tests that produce only tiny differences. That said, you shouldn't make the mistake of thinking that memory doesn't matter – particularly if your rig is a few years old and you have only a small amount of memory, such as 512MB or 1GB, installed.

Upgrading memory is one of the easiest improvements you can make to your PC – you don't need anything more than a free DIMM slot in your motherboard and an operational pair of thumbs. As we mentioned earlier, you'll need to know whether your motherboard requires DDR, DDR2 or even DDR3 memory modules, as they fit in physically different slots and aren't compatible. You'll also need to make sure you buy memory that's fast enough for your CPU's bus speed and your overclocking plans. Bear in mind that if you're planning a big overclock, many modern boards allow you to use a divider so that you can run the memory slower than the main bus and thus use cheaper, slower memory, reducing performance.

Memory is a commodity product – it's made in huge quantities, and this determines its price – so expect to pay more for older DDR than for DDR2, for instance. Prices can change very quickly too, so before buying, it's worth watching the usual websites for a few weeks.

INTEL RIG

Change: Taking our Intel rig from 1GB to 4GB

4GB of Crucial PC2-6400 DDR2

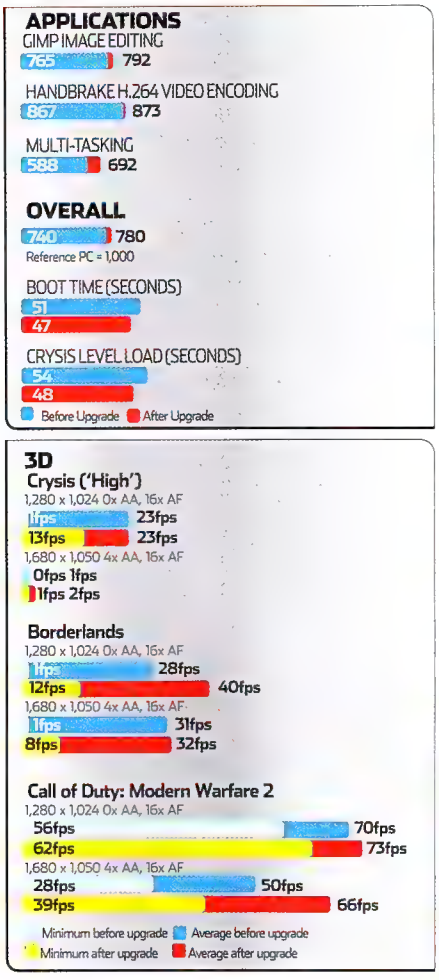
We decided to upgrade our Intel rig from 1GB of DDR2 to 4GB, in the shape of two new 2GB modules. Memory works best when all the modules in the PC are the same speed, and as our Core 2 Duo CPU has a dual-channel memory controller, a pair of matched modules (those that are sold together and are therefore identical in terms of settings) is best.

The new modules are rated at PC2-6400 speed, slightly faster than the original PC-5300 modules in the machine, which will allow for some overclocking. There's also very little price difference between the two modules. Once the modules were installed, we checked the POST screen to make sure the PC had detected them, and then started running the Media Benchmarks. We immediately saw an improvement in performance, although it wasn't enormous. The most significant improvement was in the multi-tasking test, where the upgraded PC gained more than 100 points. Indeed, this is exactly where more memory comes in handy; if you're the kind of person who has lots of web pages open in Firefox, or lots of applications running at the same time, extra RAM will help you avoid the slowdown that results from the system needing to use the page file on the hard disk.

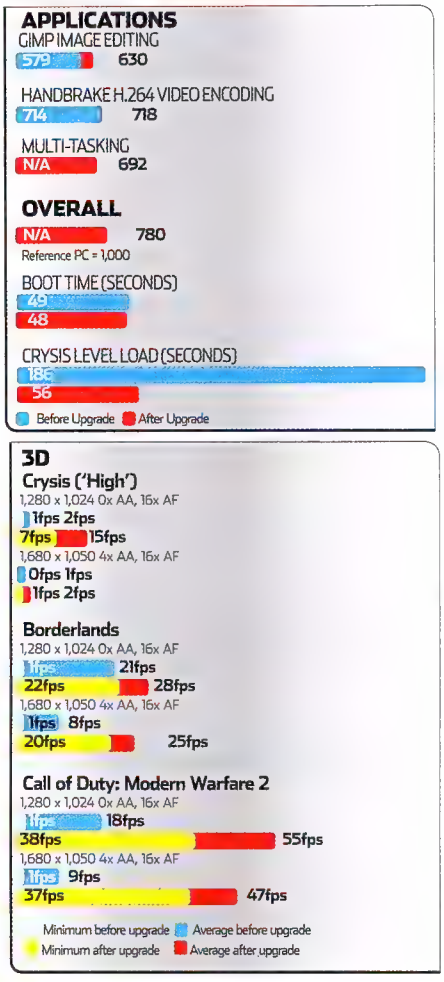
Boot time and loading times also improved by a small margin. Crysis' minimum frame rate at 1280 x 1024 also increased with the extra memory, leaping from 1fps to 13fps. This still isn't a playable frame rate but it indicates the importance of having enough memory for demanding apps, and changing in-game detail settings would certainly bring the game to a playable state.

Extra memory makes most difference outside the benchmarks though; the system feels much smoother and more responsive. It's very difficult to explain this other than to say it's definitely noticeable when using the PC – windows minimise and programs open quicker, and there's less stuttering. If you only have a handful of bucks to spare, it's well worth upgrading a system that has 1GB of DDR2 to 4GB, and it's an upgrade that benefits many different tasks.

INTEL SYSTEM **RESULTS**



AMD SYSTEM **RESULTS**



AMD RIG

Change: Taking our AMD rig from 512MB to 4GB

4GB of Crucial PC-3200 DDR

While there was little performance gain to be had in our image editing and video encoding tests, as these simulate a single application running at a time, there was a big improvement in the multi-tasking test. It was now able to run – gone was the painful sight of seeing our four-year-old AMD system grind to a halt while performing several tasks at the same time. We saw a one-second speed boost to boot times and Crysis took over two minutes less to load a level.

A surprising set of numbers cropped up in our game tests, as Borderlands proved particularly keen on the memory upgrade. The minimum frame rate at 1280 x 1024 rose from 1fps to 22fps. After a few tweaks of the settings, we had a playable minimum frame rate of 25fps.

Call of Duty: Modern Warfare 2 also became playable. Before the upgrade, we saw minimum frame rates of 1fps, but the extra memory allowed the graphics card to do its work and render the game smoothly at 1680 x 1050.

As with our increased DDR2 in the Intel rig, moving to 4GB also improved the smoothness and responsiveness of our aging AMD rig. While DDR memory might now cost more than DDR2, it made a huge difference – frankly, if you're running an older rig with just 512MB of memory then we're surprised that you haven't abandoned PC gaming and bought Monopoly. This amount of memory cripples a PC and prevents your graphics card from doing its job and rendering games smoothly, so an upgrade is a necessity.

UPGRADE Storage

HDD

Upgrading a hard disk is as easy as it is exciting – well, actually this isn't entirely true; it's certainly easy, but to pretend that hard disks have the joie de vivre of a brand-new quad-core CPU or a new graphics card is bending the truth. That said, the fact that you can grab yourself a terabyte of very quiet, fast storage for less than $100 is nothing to be sniffed at. While Samsung's SpinPoint F3 disks aren't as fast as an SSD, in our tests, their huge aereal density does make a difference. It's a SATA 3Gbps drive, and fortunately, both our test rigs have motherboards with SATA 3Gbps ports. Installing it doesn't take very long either, so we set to work.

Change: Installing a brand-new terabyte hard disk in both our Intel and AMD test systems

1TB Samsung HD103SJ SpinPoint F3

We used Acronis True Image to transfer an exact copy of our Windows XP installation and all our other apps and games from the original hard disk in each aging PC to a brand-new SpinPoint F3. Once the process was complete, we ran the benchmarks again to see what benefits this upgrade might bring. We expected to see improvements in boot times, game loading times and tasks such as image editing, and a faster hard disk should also make using your machine a snappier experience.

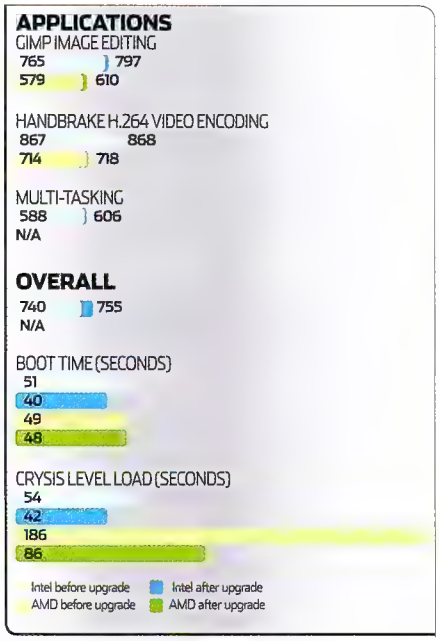
As you can see from the graphs, upgrading the hard disk boosted the benchmark results across the board. The performance gains weren't anything to get massively excited about, but they're performance gains nonetheless. In our AMD example rig, the faster hard disk didn't solve its inability to finish the multi-tasking test, as that's down to the amount of memory (see above). As the overall score is the average of the three previous results, there's no improvement there either.

The boot time saw a scarcely appreciable one-second improvement, but loading a level in Crysis saw a more considerable performance boost. Before the addition of the SpinPoint F3, you had just about enough time to make a cup of coffee before you were in-game. Upgrading the drive halved the amount of waiting time, so you'd have to settle for a cold drink or two from the fridge.

In the Intel example rig, the performance gains were much more significant, with all the Media Benchmark results edging their way upwards. However, as some tests use the hard disk more than others, the overall score increased by only 15 points. The boot time and Crysis level loading time both decreased by about ten seconds, which was a more noticeable and welcome improvement.

The speed gain to be had from upgrading your hard disk won't free up enough time to let you catch up on those missed episodes of Fringe, but it results in a more responsive PC. The great performance gains will be seen in level loading and boot times, although the games themselves won't run any faster. That said, simply for the fact that it can play a big part in making your PC less frustrating to use, thanks to minimising waiting time, upgrading from an old hard disk is definitely worthwhile at this price. You may need to pair it with an increase in RAM if you have an older machine to see the full benefits, however.

HDD RESULTS



SSD

The cost of an SSD is mostly determined by the cost of flash memory, and as a result, their prices are up and down like a bunch of rubber-band balls on a trampoline. Carried by a compulsively competitive rock climber with crippling vertigo. In a lift. That said, if you catch the prices when they're close to $300 rather than $500, 128GB SSDs look like a worthwhile consideration for your PC. A 128GB Crucial M225 SSD is a good balance between cost and performance.

Installing an SSD is as easy as plugging in the SATA data and power cables and

finding a discreet nook in which to tuck your drive. You can use double-sided adhesive to shimmy it away behind the 5.25in bays, or use a Mounting Kit to fit it into one of your PC's drive bays.

Change: Installing a brand-new 128GB SSD in both our Intel and AMD test systems

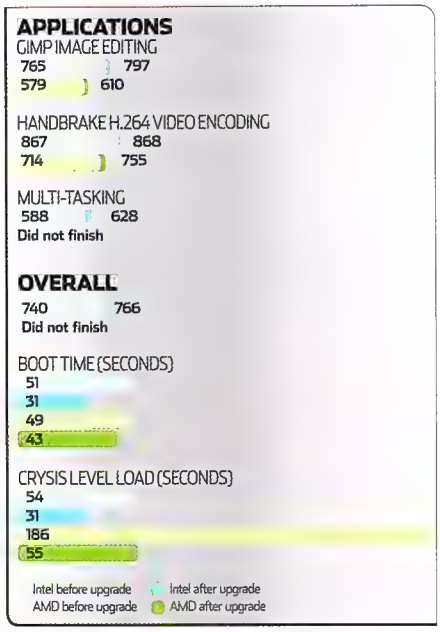
Product 128GB Crucial M225

As with our hard disk upgrade, we used Acronis' True Image to transfer an exact copy of our OS and programs to the SSD. In our older AMD test rig, the difference to the Crysis level loading times was epic. The time from hitting the 'load' button in the game's interface to being in the jungle and ready to shoot was cut from over three minutes to just under one minute. Interestingly, boot time was scarcely affected. This result hints at the 512MB of memory causing a bottleneck in the process, given that both boot time and the Crysis level load test came down to a snappy 31 seconds in the Intel test rig.

The Media Benchmarks saw a benefit from the SSD too. However, the difference was hardly enough to justify sacrificing goats to the hardware gods in return for the performance boon bestowed on your unworthy PC. In the Intel rig, multi-tasking saw the biggest improvement, increasing from 588 to 628, which helped to bump the overall score by 26 points from 740 to 766. The AMD rig failed to complete the Media Benchmarks in their entirety, but the tests that were completed saw similarly minor performance gains.

Upgrading to an SSD is much the same as upgrading your hard disk, apart from that fact that it provides twice as much performance benefit for four times the price. Viewed purely in objective economic terms, SSDs still aren't at the point where they're an obvious buy. That said, as with the hard disk, an SSD benefits your system in terms of noise, smoothness and responsiveness, and this is impossible to graph. Still, if you have an older PC similar to our example rigs, you'd be much better off with a combined memory and hard disk upgrade.

SSD RESULTS



UPGRADE

Graphics card

Upgrading your graphics card is another relatively easy move, especially as we no longer need to worry about AGP – systems that old will be in need of a complete rebuild. Your concerns when shopping for a new PCI-E graphics card will be whether your PSU can handle it, and also how your CPU and monitor will cope. At least that's how traditional wisdom has it. In theory, there's little point in buying a top-of-the-range card if you have a monitor with a very low maximum resolution, and a slow CPU, since it needs to feed data to the card at a quick enough rate in order for its full performance potential to be realised.

With this in mind, we decided to try two graphics card upgrades for our old PCs: a cheap and cheerful budget card in the shape of the ATI Radeon HD 5770, and the far more powerful Radeon HD 5870.

Change: Installing a brand-new budget graphics card in both our Intel and AMD test systems

ATI Radeon HD 5770

Thanks to its 40nm, low power-consumption GPU, the HD 5770 doesn't need a whopping power supply to do business. A 400W PSU would be ample to run the rig with this card installed, and like the GeForce 8800 GTS 320MB, only one 6-pin PCI-E power connector is required.

With the ageing GeForce 8800 GTS 320MB installed, modern games crippled our example rigs. No prizes for guessing that Crysis was more brutal than Borderlands and Call of Duty: Modern Warfare 2, either. At stock speeds, neither rig could clock up a minimum frame rate even resembling playable in Crysis with all settings on high.

Adding the Radeon HD 5770 to the Intel test rig didn't have the effect of waving a magic wand – at 1280 x 1024, the upgraded machine actually had a slower average frame rate. It made a positive difference at 1680 x 1050 with 4x AA, taking the average from 2fps to 18fps, although you'd obviously still need to reduce some of the settings to get a playable frame rate. Adding the card to the AMD rig made no difference to Crysis – the PC remained bogged down with terrible frame rates, proving that spending money on just one component isn't always the answer.

Adding the Radeon HD 5770 to the Intel rig almost brought Borderlands to a playable minimum frame rate. We played the game with all settings on high, so with a little tweaking, you can take the frame rate from a stuttery 22fps to a smooth 25fps. This was only possible at 1280 x 1024; at 1680 x 1050, the game was still so slow as to be unplayable. In the AMD rig, the

minimum frame rates barely budged from 0fps for 1280 x 1050, and 1fps for 1680 x 1050, both before and after the upgrade.

While Modern Warfare 2 is a new game, the engine it uses is several years old and the game isn't too demanding as a result. The Intel rig was able to run the game smoothly at 1680 x 1050 without a hitch. Adding a HD 5770 delivered a welcome buffer to the minimum frame rate at 1680 x 1050, boosting it from 28fps to 52fps.

From the scores here, it's clear that upgrading from an old entry-level card to a modern entry-level card is hardly a great move. Even with a relatively decent system – dual-core Core 2 CPU, 1GB memory – the improvements are far from consistent. If you're running an even more geriatric system, such as our AMD rig, with a slow CPU and little memory, it will provide practically no benefit. If you have only have a couple of hundred dollars to spend, it would be better to wait until you can afford a more considerable upgrade or a complete overhaul.

Change: Installing a brand-new high-end graphics card in both our Intel and AMD test systems

ATI Radeon HD 5870

The release of ATI's Radeon HD 5870 marked a notable jump up in single GPU performance and was the first new GPU release in some time not to cost well in excess of $600. The cards have held their price well in the first few months of release though and will still set you back about $550.

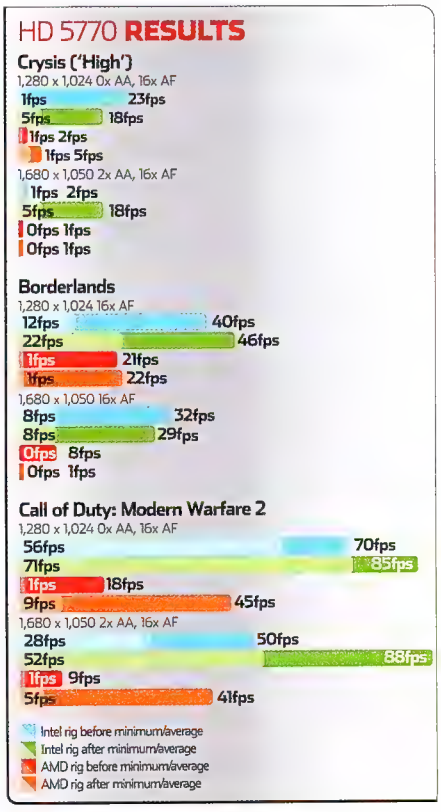
For this upgrade, there are a few requirements regarding your components. First up, you need a PSU with a rated output of 600W or more, which has two free 6-pin PCI-E connectors, or a single 6-pin connector and a pair of free Molex connectors to use the power adaptor that ships with the card. You'll also need a spacious case, as the card is 10.5in long; if you're using a shoebox-sized chassis, you may need to look elsewhere for an excuse to blow your funds.

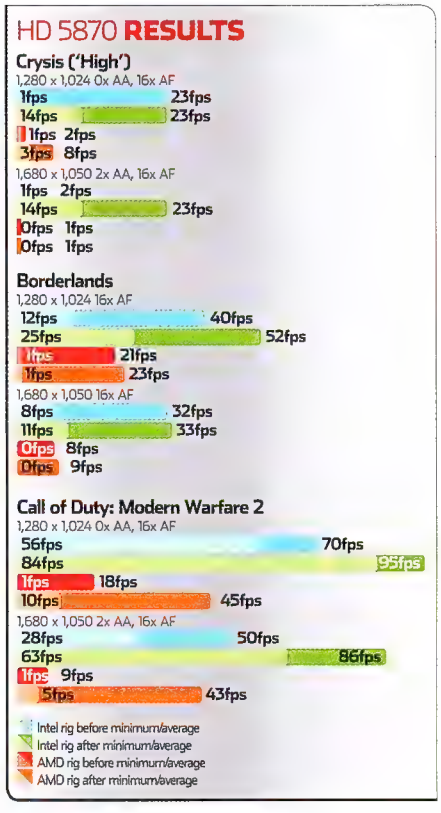
You might think that planting one of the best graphics cards on the market in a PC would instantly reward us with some impressive frame rates in all the games on test. However, this wasn't the case. While Crysis is the most demanding game on test, you'd expect a $550 graphics card to manage a playable frame rate at 1280 x 1024. However, in our Intel rig, it managed a 14fps minimum and 23fps average, whereas the AMD system was still stuck in single figures. Interestingly, the Intel system recorded the same average at 1680 x 1050 (a result also matched by the HD 5770) when playing Crysis. This clearly illustrates that components elsewhere in the system are preventing the graphics card from unleashing its full potential.

Borderlands was a little better. Slotted into our Intel rig, the HD 5870 managed a playable frame rate at 1280 x 1024, although realistically, even this is a pitiful attempt hindered by the old hardware. The AMD rig saw little or no benefit from the upgrade, with the game running at speeds that were a hair's breadth from going backwards.

The easiest game we tested was Call of Duty: Modern Warfare 2. The Intel rig was able to run the game smoothly before we added a new graphics card, and the HD 5870 saw the sort of boost you'd justifiably expect for that sort of money. The minimum frame boost at 1680 x 1050 was particularly welcome, as the stock result of 28fps verges on the stuttery. A 68fps minimum provides a decent buffer against slowdown when the action becomes hectic.

Again, the AMD rig proved that it was beyond hope. Playing Modern Warfare 2 smoothly, even at the least demanding resolution, was too much for the rig even with a high-end graphics card plonked in its PCI-E slot. At 1280 x 1024, the game juddered along at a paltry 10fps.





UPGRADE CPU

If you're running an older Socket 939 rig such as our AMD example system, upgrading your CPU will be tricky, as AMD moved away from Socket 939 years ago. This means eBay is your best option, and your choices will be dictated by what's available. As the Athlon 64 X2 4200+ in our system was one of the fastest Socket 939 chips made, there aren't many CPUs from which to choose. You're therefore looking at a new CPU, motherboard, memory and cooler – the best part of a complete rebuild. We cover this option below.

The picture is rosier if you have an LGA775 system, as Intel has only just moved away from this socket and still makes LGA775 CPUs, so there are plenty from which to choose. Be careful when upgrading, though, because while all LGA775 CPUs are pin-compatible with the socket, Intel revised the power requirements several times. Check exactly which CPUs your motherboard is compatible with before buying.

If you have an older motherboard such as the Asus P5B, you'll need to update the BIOS to work with 45nm Core 2 processors. Download this from the manufacturer's website. You'll also need a decent HSF, such as the Freezer 7 Pro.

Change: Installing a quad-core CPU in our Intel test system

2.66GHz Intel Core 2 Quad Q9550

We've raved about the Core 2 Quad Q6600 often enough – and indeed it's a fantastic CPU – but sadly they're no longer being manufactured, so you'll need to hunt for one on eBay. Try to opt for the G0 stepping, as it runs cooler and overclocks better. For the purposes of this feature, we obtained a new Core 2 Quad Q9550. It's easy to install, and once we'd verified with CPU-Z that the chip had been detected properly and was running at full speed, we started running the benchmarks.

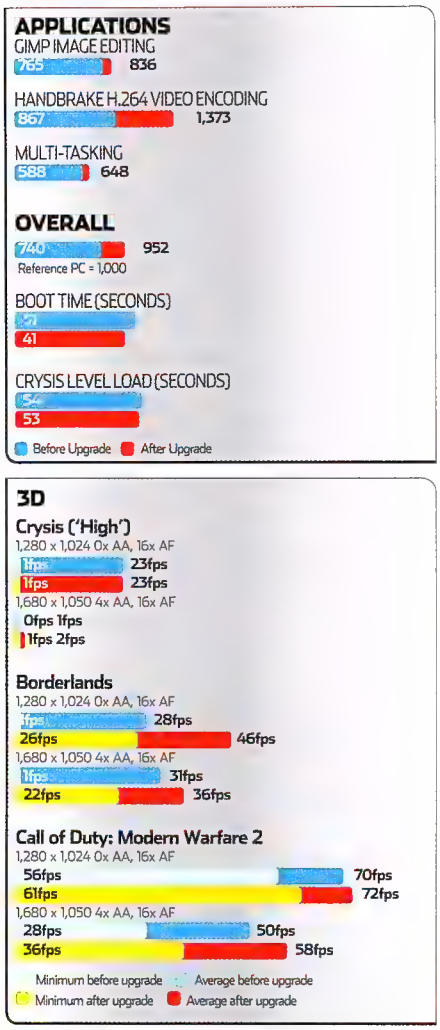
Our Media testing saw some serious improvements, unsurprisingly. The HandBrake video encoding test responds especially well to additional CPU cores. The video encoding score shot up from 867 points to 1,373, an increase that contributed to an overall score of 952 points compared with the pre-upgrade performance of 740. If you perform a lot of video encoding and image editing, this upgrade would see you right.

We were pleased to see that boot times were faster with the addition of the quad-core chip, dropping by exactly ten seconds. Loading a level in Crysis benefited from only a one-second speed bump, which isn't such an exciting result.

The frame rates in Borderlands were exciting, though. The game reacted very favourably to the CPU upgrade, with the minimum frame rate at 1680 x 1050 increasing from 1fps to 22fps. This is easily raised above the playable minimum of 25fps with some tweaks to the settings. The minimum frame rate in Call of Duty: Modern Warfare 2 also saw a welcome increase, rising from 28fps to 36fps. Crysis, however, maintained its grinding drudgery of unplayability.

Upgrading to a quad-core CPU such as the Q9550 definitely returns worthwhile performance gains, particularly if you're interested in running 2D apps. It also helps in games and boot times.

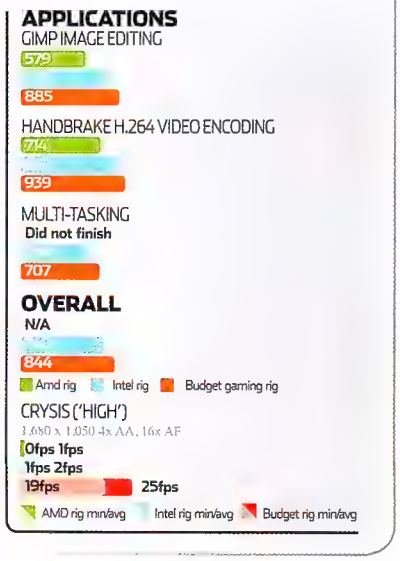
INTEL SYSTEM **RESULTS**



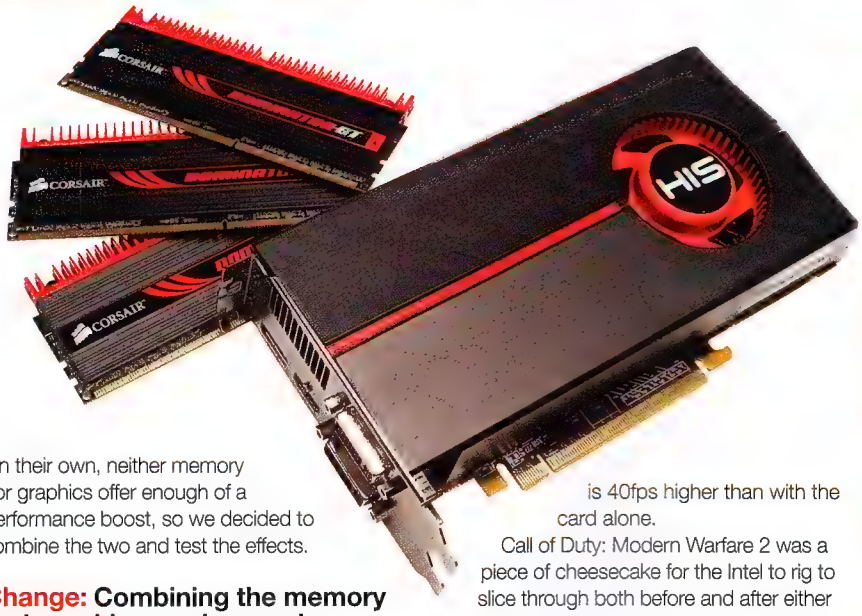
UPGRADE OR START AFRESH?

If we had our way, we'd build a new rig from scratch every six months or so. Sadly, a lack of funds usually prevents this dream becoming a reality. However, if you've been running a rig for three or four years, a complete rebuild is easy to justify. If you were planning to spend $500 on breathing new life into it, another $200 probably isn't an unattainable sum. As we showed in our budget gaming rig feature, you can build a pretty handy new PC for less than $1000. To keep matters simple, we used the stock-speed results from all rigs (not everyone will overclock, and those who do will overclock by different amounts). This way, we get a fair comparison of the base figures. In the Media Benchmarks, the budget gaming rig had the advantage in all the results. The overall score was a significant 100 points faster than the old Intel example rig. Gaming showed up the differences most starkly, though. The budget PC was just a few frames per second away from playing the game smoothly at 1680 x 1050 with all settings on high. This is due in part to the excellent GeForce GTX 260, which is currently suffering from stock shortages, but it's also because the PC is very well balanced. It has a fairly fast hard disk, 2GB of memory and a good graphics card, which means that despite having only a dual-core CPU, it can still cut it.

If you were planning to spend $500 on a rig with an obsolete motherboard, we reckon you should seriously consider a complete overhaul of the key components. If you have an LGA775 system, bear in mind the importance of spreading your budget over a few key component categories rather than focusing on just one area.



UPGRADE COMBINATIONS



On their own, neither memory nor graphics offer enough of a performance boost, so we decided to combine the two and test the effects.

Change: Combining the memory and graphics card upgrade
4GB Crucial PC-3200 (AMD), 4GB Crucial PC2-6400 (Intel) and ATI Radeon HD 5770

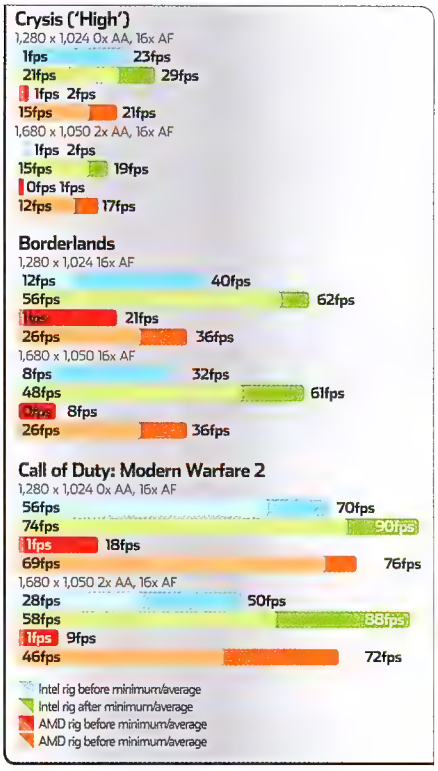
Upgrading to a Radeon HD 5770 in our example rigs saw little or no performance increase in Crysis. Throw some extra memory in alongside, though, and suddenly the graphics card fulfils more of its potential. In the Intel rig, the game now hit a minimum frame rate of 21fps at 1280 x 1024 with all settings on high. A little tweaking and you'd achieve a smooth minimum frame rate of 25fps – a far cry (no pun intended) from the minimum of 5fps with just the graphics card on its own.

The AMD rig was still a way off hitting a smooth result in Crysis with all the settings on high, but the frame rate increase was significant. Installing the HD 5770 on its own returned little or no benefit, while adding only the memory saw the minimum frame rate increase from 1fps to 7fps at 1280 x 1024. Both upgrades together saw the minimum rise to 15fps at the same resolution. Dropping all settings to medium netted a minimum frame rate of 27fps, and the game still looked pretty hot.

The performance increases in Borderlands were even more significant. The combination of memory and graphics resulted in playable frame rates at both 1680 x 1050 and 1280 x 1024 in the AMD rig. The 26fps minimum scored in both resolutions is only just what we consider smooth, but it's a great result for a rig that's six years old with just a few hundred bucks in upgrades. Armed with both a new graphics card and 4GB of DDR2 memory, the Intel rig ran Borderlands like a bat out of Fyrestone. The minimum frame rate of 48fps at 1680 x 1280 provides smooth visuals and is 40fps higher than with the card alone.

Call of Duty: Modern Warfare 2 was a piece of cheesecake for the Intel to rig to slice through both before and after either of these upgrades were applied. With an HD 5770 and 4GB of DDR2 memory, we saw the best frame rates in the game so far, but as the numbers were already smooth enough before the upgrade, the results are academic. Likewise in the AMD rig, simply upgrading to 4GB of DDR memory was enough to let the 8800 GTS do its work and play the game smoothly even at 1680 x 1050. If you wanted to increase your performance only in Call of Duty Modern Warfare 2, it wouldn't be necessary to invest in both of these upgrades to do it.

If you have a small amount of memory and an older GPU such as a GeForce 8800 GTS, it's likely that the limited RAM is hindering your graphics card from operating at its full potential. For this reason, upgrading the graphics card alone is a waste of time. Upgrading both the memory and the graphics card will allow your new GPU to do its job and provide significant performance boosts in games, even in more demanding games such as Crysis and Borderlands.



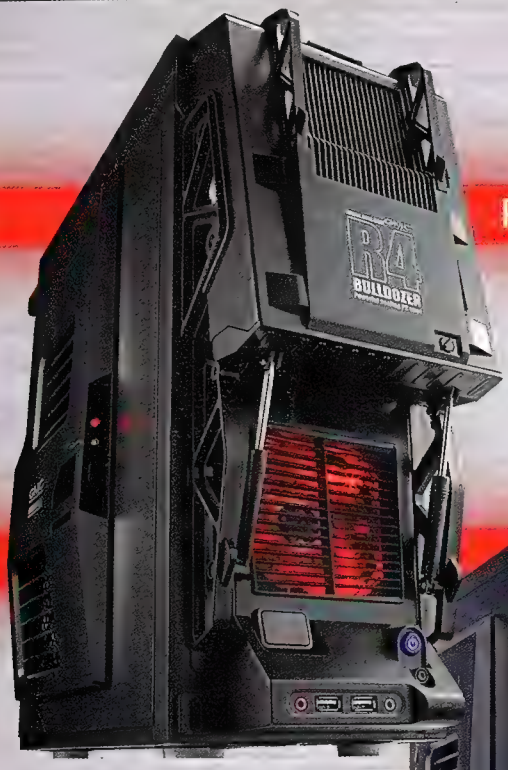
CONCLUSION

Perhaps the most interesting conclusion to emerge from this feature is that no single upgrade will instantly turn an old, stuttering PC into an amazing powerhouse of performance that sweeps all games and benchmarks before it. Some upgrades offer very targeted improvements – for instance, if you're encoding lots of video, you absolutely must buy yourself a quad-core CPU – but most offer improvements across a range of activities, and they're often unable to take a benchmark from failure to success on their own.

While this advice may seem dispiriting if you're on a tight budget, you should at least be consoled by the longevity of the hardware on show, in particular the LGA775 system. It's possible to upgrade this machine without the need for a complete rebuild, so you could easily add a combination of upgrades over a longer period of time to lessen the financial impact. The Socket 939 system's upgradability is somewhat limited by AMD's decision to change sockets, but such moves are necessary for CPU innovation (which is something AMD sorely needs). Aside from a new CPU, it's possible to boost this system's storage, memory and graphics. You'd then be able to transfer many of these upgraded components to a new system if you upgraded again.

Of course, you could (and should) try overclocking your PC if you want to improve its performance. We haven't really touched on this here because it's a huge topic, and we covered it in depth last month. If you can't afford a CPU upgrade, overclocking can be a great alternative, and it's far cheaper.

GMC
Innovation & Design



R-4 BULLDOZER

Middle Tower ATX Case

- Innoative & Unique Design
- Efficient Internal Structure
- Supports Full ATX
- Supports largest graphic cards
- Supports 7 extension slots

Front Panel Function

- World's first patented vertical Optical disk Drive (ODD)
- Stylish front Fan with LED Light
- Easy removal of ODD cover

X-7 X-STATION

Middle Tower ATX Case

- Innoative & Unique Design
- Multi-power switch (top & front)
- Efficient Internal Structure
- Supports Full ATX
- Supports largest graphic cards
- Supports 7 extension slots

Front Panel Function

- Internal system monitoring with front LCD
- 1 x Sliding ODD cover
- Supports 4 x ODD (3x5.25" and 1x3.5")

K-2 EBONY

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HARDWARE

NEWS, REVIEWS AND ROUNDUPS ON THE LATEST HARDWARE

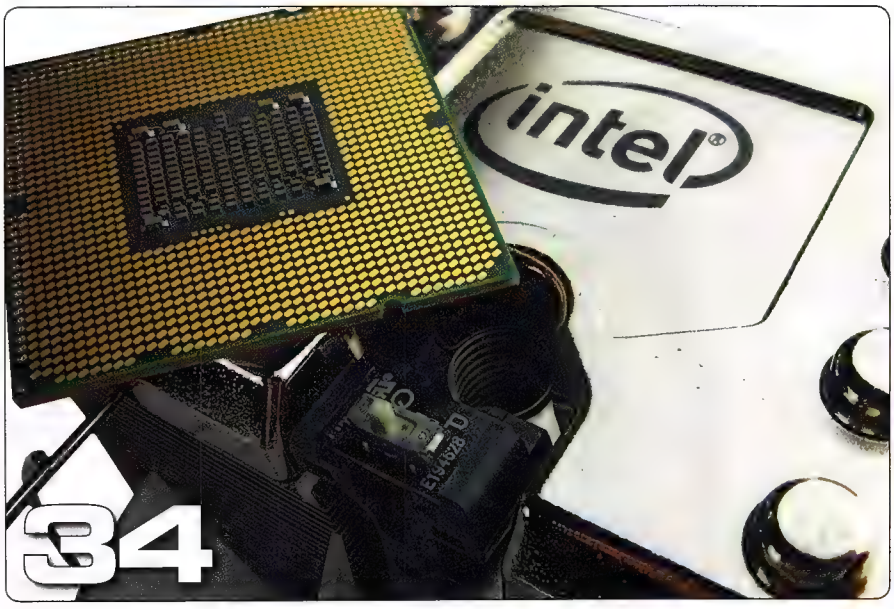
We've been busy this month, looking at the latest and sexiest technology from companies who unblinkingly manage to impress time and time again.

Embodying this ethos is Intel; with their newest six-core processor churning through benchmarks like a pair of teenagers rip through a milkshake. For fans of processing power high enough to cause a rip in the space/time continuum, this is a definite must.

The usual swathe of hardware reviews make a reappearance with tech from some big names, and another beastly 5970 card on test.

Finally, we've rounded out the Hardware section with a look at HD Projectors. So many delicious pixels!

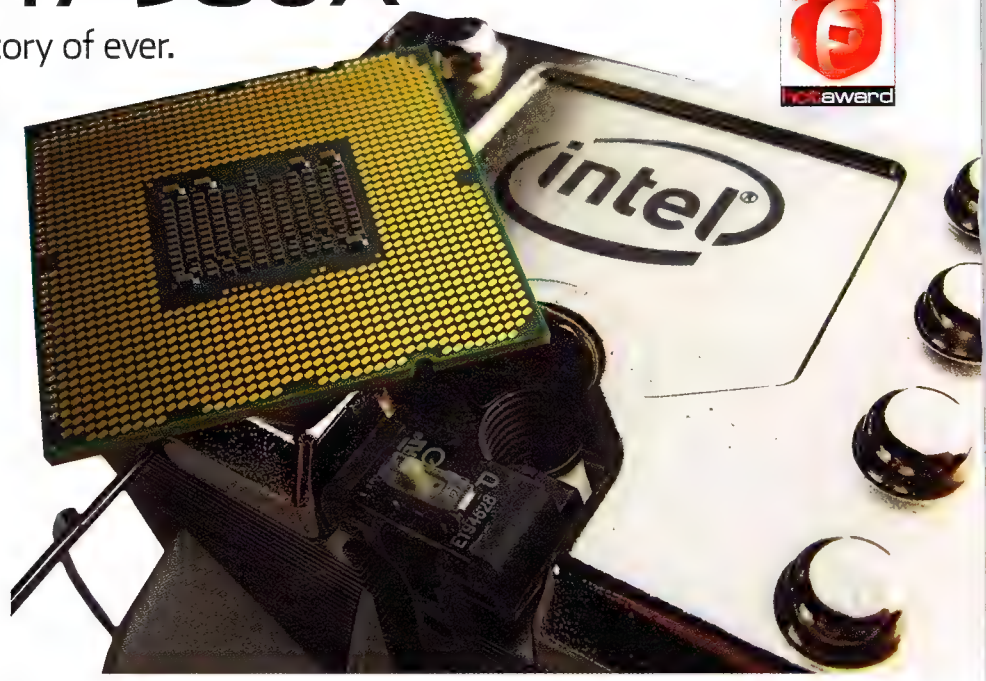
HARDCORE CONTENTS



Intel Core i7 980X

Intel's fastest chip in the history of ever.

Street Price $1749 Supplier Intel
Website www.intel.com
Specifications 3.33GHz hexa core; 32nm manufacturing process; 'Gulftown' core; 64KB L1, 256KB L2, 12144KB L3; 25x multiplier; 130W TDP; LGA1366.



When we said last Issue that Intel's R&D team has been slogging away at new designs, we really weren't kidding. Perfecting its manufacturing process with the Clarkdale range of processors, the time has come for a new range of chips to hit the market – ones that are aimed at us, the enthusiast power user. The kind of people who simulate the effects that their doomsday laser will have on the eastern coast of the country, while analysing the human genome for weaknesses and carbon-dating their sandwich on a per-atom basis for consistency – these are the exact people who will be interested in this chip. But what makes it so good?

Hexa-core architecture

In years past we've seen a progressive movement away from simply increasing processor clockspeed, instead adding in things like Hyperthreading (that featured in the Pentium 4 family, was removed, and is now back again) and multiple processing cores that share the workload. At the same time that more cores were added, clock speeds generally moved backwards, but with the i7 980X this hasn't happened. Rather, while retaining the 3.33GHz clockspeed of the previous top-end chip, the 975, Intel has boosted the core count from four to a whopping six – all within the same physical LGA1366 package, and hanging on to the unlocked multiplier that top-end chips usually boast.

The only way that engineers could accomplish such a feat is through a manufacturing process shrink, and this new chip has been thrown on a hardcore grapefruit diet to slim it down from 45nm to a bloody small 32nm. With plenty of practice and experience provided from the Clarkdale launch, these new Gulftown processors come bursting out of the gates with no restraints placed on specs – each of the six cores retain 64KB of L1 cache, 256KB of L2 cache, and they all can squabble between themselves over a gigantic pool of L3 cache to the tune of 12MB. As seen in the die shot, the six identical rectangles form the processing cores, and each rests above a darker square of L3 cache, other pieces of the puzzle slotting in around the edges to fill in the triple-channel memory controller and other I/O tasks.

32nm isn't that small, is it?

To help wrap your head around exactly how small a 32nm transistor is, Intel has released some fun facts. In terms of size, 3000 of them could fit on a single full stop on this page, while you'll need that same amount stacked on top of each other to equal the width of a single human hair. If Usain Bolt, the Olympic runner, ran with a stride of 32nm, he'd need to take 3,125,000,000 steps to complete a single 100m dash – and the processing speed of this latest processor is 4,767 times faster than Intel's first 4004 processor. Really puts it into perspective!

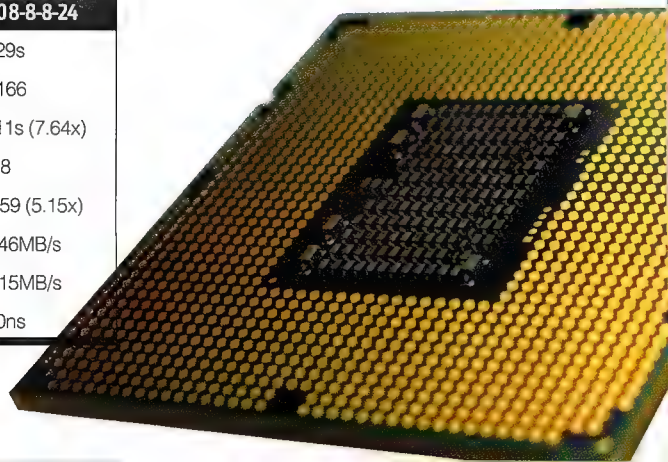
Sixy performance

Logic dictates that if you take a single core from a dual-core Clarkdale, and a hexa-core Gulftown, then benchmark both of those running at the same frequency, you should get similar scores. In practice this is slightly skewed by memory bandwidth limitations for Clarkdale, but otherwise you'd get the same result. Where Gulftown breaks away from Clarkdale (and completely snaps it in two) is multi-threaded performance.

Hyperthreading has made a reappearance in this chip, taking the six physical processing cores and doubling that to give an effective

Intel Core i7 980X

i7 980X	133x25; DDR3-1600 8-8-8-24	150x25; DDR3-1500 8-8-8-24	160x25; DDR3-1600 8-8-8-24
PiFast	25.46s	22.70s	21.29s
wPrime 32M – single thread	38.719s	34.444s	32.166
wPrime 32M – multi-thread	5.069s (7.64x efficiency)	4.557s (7.56x)	4.211s (7.64x)
CineBench R10 64-bit – single thread	4750	5354	5718
CineBench R10 64-bit – multi-thread	25346 (5.34x efficiency)	28852 (5.39x)	29459 (5.15x)
Everest Read	14538MB/s	15398MB/s	16346MB/s
Everest Write	90588MB/s	10221MB/s	10915MB/s
Everest Latency	55.2ns	53.1ns	50.0ns



twelve software threads. With so many hungry mouths to feed, Gulftown does an amazing job of coping under pressure; wPrime finished in an incredible *five seconds*, while even Cinebench topped out at 25,346 points. What was most impressive at stock speeds was the efficiency increase as given by Hyperthreading, boosting the processing speed up to 7.64x over what a single core could muster.

Surprising us completely, the Gulftown at stock gave the ATI 5970 the breathing space needed to stretch its legs in 3DMark06, giving us 1500 more purely graphical points. However, no self-respecting Atomican would buy Gulftown and not overclock it, so that's exactly what we did next.

Faultless overclocking

Whacking the 980X into our ASUS Maximus II Extreme X58 mobo alongside 6GB of speedy Corsair RAM, we gave the stock cooler a go but quickly changed to the Thermalright Ultra 120 Extreme, setting our sights on pushing this chip as far as it could go on air. A quick flash of the board to a new BIOS was all that was needed, and for those X58 users out there it's a simple drop-in upgrade. Dialling in a new multiplier of 28x with stock volts of 1.2V returned a confusing 26,307 points in Cinebench – until we realised the chip was automatically *underclocking* itself thanks to the C1E setting. Stripping that and all other safety precautions away (who needs them!) gave a much more satisfying result of 28,941, and we kept pushing the clocks hard until we reached a max of 33x.

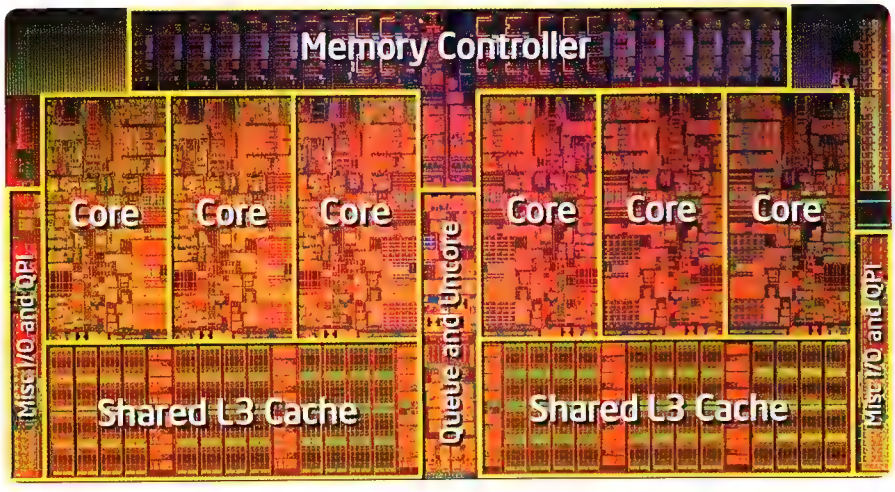
This multiplier gave a final clock of 4405MHz (33x133 @ 1.4125), giving a huge 33,748 points! Keep in mind that there are six cores here, all running at 4.4GHz – that's some serious bragging rights at any LAN. The chip kept its surprises going, and even when overclocked to a more reasonable speed of 4273MHz (32x133 @ 1.35V) the 5970 returned a 3DMark06 score of 28,771 – with the CPU score only increasing by 1500. What this means is that even with a hexa-core overclocked CPU, a 5970 is *still* bottlenecked by the processor!

Stock not-so-standard

Stock coolers are typically fantastically useless wedges of metal, barely keeping the CPU from melting into a pile of orange, burning slag. The one that is included with the 980X bucks all traditions; it features eight heatpipes, a large frameless 92mm fan, an awesome tool-less no-pushpin mounting system with backplate and a selectable speed for the fan. Not all is perfect, with the fan generating a loud 66.4dBA on 'Quiet' and a freaking insane 75.7dBA on 'Performance', but even on Quiet we hit 4GHz – rising to 4.12GHz on Performance. The design isn't perfect, with hardly any airflow moving through the tightly-spaced fins no matter the speed, but it's more than capable of keeping temps down on this six-core beast at stock in any situation.

A smarter choice?

Even though the performance of the 980X is phantasmagorically awesome, this is not a chip for everyone. With an RRP of $1749 it comes in at roughly the same price as an entire new computer, though it does match the 975 for cost and offers two more cores with better overclocking performance while remaining very cool at idle. If you're an evil genius who's hell-bent on working out how best to destroy the world however, it's the *only* CPU we'd ever recommend. Ever. **JR**



GIGABYTE 790FXTA-UD5

USB and SATA 3.0 début on an AMD platform.

Street Price $265 **Supplier** GIGABYTE
Website www.gigabyte.com.au

Specifications Socket AM3; AMD 790FX chipset; ATX form factor; 3x PCIe x16 (1x8 electrical); 3x PCI; 1x PCIe x1; 6x SATA2, 2xSATA3; 2xUSB3; DDR3-1866+

AMD's platform has seen quite a lot of love over time, a love that continues to grow deep within large manufacturers such as GIGABYTE (like a tumour, but much less deadly). While the latest features such as heatsink design and other aspects don't quite make it to these boards as fast as its current flavour-of-the-month P55 boards, it didn't take long for a 790FX-based board to get a refresh.

The 790FX chipset is getting along in years now, though it's still pretty potent as an enthusiast chip due to the large amount of PCIe lanes it offers. Similar to the X58 on Intel's side, the 790FX provides capacity for Triple Crossfire, though on this board the performance will be slightly hindered due to the third slot being limited to only 8x electrically. The reason for this limitation is the addition of other devices that use those extra PCIe lanes; but we'll get to those soon.

This board offers compatibility with socket AM3 processors, as well as DDR3 memory in dual channel. The power delivery around the socket is placed underneath aluminium heatsinks that are joined with a single (very long) nickel heatpipe, threading the power delivery with the Northbridge and Southbridge chipsets. It proved excellent at managing temperatures, and only minimal airflow was needed to keep a check on temps.

The 8-pin CPU power connector is nestled between this cooling array and the I/O panel, though you'll need the fingers of an acrobat to access it easily once installed within a case alongside a large aftermarket heatsink. Thankfully, the 24-pin ATX power connector is in its typically easy-to-reach spot, and even more helpfully there are hard power and reset buttons placed here. This seems pretty small, but when you've got two graphics cards on top of a sound card and RAID card installed you'll love it.

There's even a hard clear CMOS button on-board, wearing a protective plastic cap that avoids accidental erasing of your precious overclocking settings. Sitting next to this button are the six SATA 2.0 ports from the SB750 Southbridge chip, joined by two white SATA 3.0 ports that are powered by an onboard Marvell chip. They're all right-angled for easy cabling, and there's the full bandwidth available. Not only is there SATA 3.0 on this board, but GIGABYTE's engineers have also packed USB 3.0 in as well.

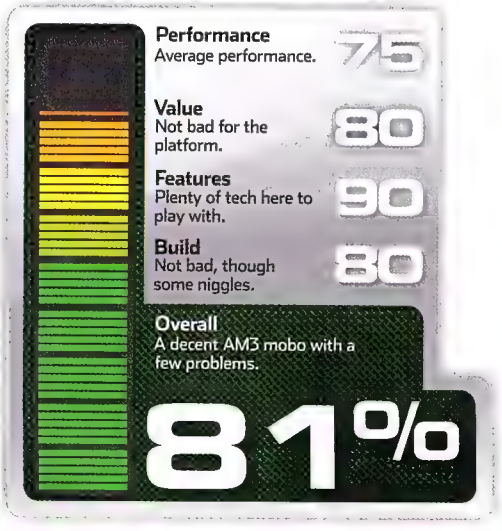
A NEC chip powers two blue ports of USB 3.0 goodness at the rear I/O panel, joined by an impressive collection of other ports: two PS/2, Optical/Coaxial, 6/4-pin Firewire, four USB 2.0 and two Gigabit Ethernet ports. GIGABYTE has also applied its 333 tech to all the USB ports, giving three times the amperage of the standard spec so you can charge all kinds of things from them, and run 2.5in HDDs more reliably.

Everything 3.0 on this mobo is powered directly from the chipset's PCIe lanes, giving the full bandwidth to all devices at all times. This is great news for those looking to upgrade their AMD rig for the next storage interfaces, and is a much more elegant solution compared to what we've seen with some P55 motherboards.

All along this board has been great, except for its overclocking performance. We managed only 3760MHz (235x16 @ 1.475V) maximum, and even running at 3675MHz (15x245 @ 1.475V) it wasn't stable. While this may be improved at a later date with BIOS updates, it's still not amazing. **JR**

GIGABYTE 790FXTA-UD5

X4955	200x16; DDR3-1333 7-7-7-21	217x16; DDR3-1446 7-7-7-21	230x16; DDR3-1532 7-7-7-21
PiFast	34.15s	31.64s	29.92s
wPrime 32M – single thread	44.709s	41.075s	39.14s
wPrime 32M – multi-thread	11.716s (3.62x efficiency)	10.764s (3.81x)	10.233s (3.77x)
CineBench R10 64-bit – single thread	3704	4024	4252
CineBench R10 64-bit – multi-thread	13102 (3.54x efficiency)	14387 (3.58x)	14727 (3.46x)
Everest Read	8261MB/s	8805MB/s	8900MB/s
Everest Write	6774MB/s	7332MB/s	7032MB/s



ASUS P7H57D-V Evo

A high-end board for a low-end platform.

Street Price $300 **Supplier** ASUS
Website www.asus.com

Specifications Socket LGA1156; Intel H57 chipset; ATX form factor; 2x PCIe x16 (1x8 electrical); 2x PCI; 3x PCIe x1; 6x SATA; DDR3-1333

Specifications www.atomicmpc.com.au/?166649

The H57 Express chipset, notable as the chipset of choice for this board, is a funny one. Practically identical in appearance to the popular P55 Express, there are a few subtle – though important – differences that keep it from being enthusiast-grade. First and foremost is a pipeline included on the chip called the Flexible Display Interface; an external link from the CPU to the rear I/O panel that allows the integrated GPU in Clarkdale chips to get outside and run rampant on your monitor. However, this doesn't increase its overclocking performance; in some cases, it even hinders it.

What is most disappointing about the H57 is the complete lack of Crossfire or SLI support in hardware, and while some vendors still list support for Crossfire, the fine print reads "Software only". Bringing this seemingly roundabout description of the chipset back into the motherboard, what it results in is a high-end price tag of $300, applied to a high-end motherboard that can't handle high-end graphics setups. Yes, the P55 boards are limited to dual 8x too, but at least they can handle dual 8x *in hardware*. Even stranger is that to buy this platform and use the graphical capabilities, you need to limit yourself to dualcore (again, the standard quadcore LGA1156 CPUs will still work, but in that case why not go P55?).

With the things that this board doesn't quite nail, there are some key features that it manages to hammer in satisfactorily. A great power delivery system is installed around the LGA1156 CPU socket, providing some clean (and stable) power to the chip. ASUS' own EPU power saving chip is also here, but doesn't come with the fanfare that it did at launch. The usual funky abstract art heatsinks are used around the socket, keeping temperatures under control and looking fabulous.

The standard four DDR3 slots are joined by standard 8- and 24-pin power connectors, the latter of which lies beside a MemOK! button. This supposedly tests memory stability at boot, which seems like a relatively superfluous feature that you'll only use in 0.1 per cent of situations, but hey – buttons sure are fun to press.

Amusing buttons aside, there's a disappointing lack of reset or power buttons on this board, nor is there a clear CMOS button. This is a huge oversight considering the price, and nor is there an LED POST screen or funky voltage readout panel – there's none of the usual premium frills here. Even the Realtek ALC889 audio chip used isn't its usual high-end Via VT2020 chip, signalling either low stock levels or a sheer case of the "we don't cares".

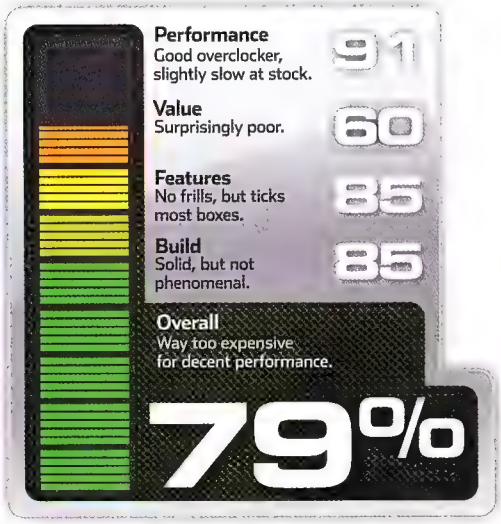
Those observant readers out there (I know you exist) will have noticed the inclusion of SATA and USB 3.0 on this board, providing two of each alongside six standard SATA 2.0 and four USB 2.0 ports. Thanks to the platform limitations however, ASUS has used a PLX chip onboard (see detail in the gallery) that takes the PCIe lanes and effectively doubles them, providing more bandwidth for the ports. However technically impressive this is, it comes at more expense – the PLX chip ain't cheap at roughly $US20 a pop. Nor does the inclusion particularly justify this huge price – competing P55 boards offer both USB and SATA 3.0 for prices around $170.

We did hit the chip's max clock of 4425MHz, but this only matched last month's $130 H55 board. For a board that doesn't offer *that* much over cheaper offerings and competing platforms, we seriously think it's an unnecessary product.

JR

ASUS P7H57D-V Evo

i5661	133x25; DDR3-1333 7-7-7-21	150x25; DDR3-1500 7-7-7-21	175x25; DDR3-1400 7-7-7-21
PiFast	25.35s	24.29s	20.83s
wPrime 32M – single thread	35.927s	34.164s	29.328
wPrime 32M – multi-thread	13.927s (4.67x efficiency)	12.792s (5.25x)	11.372s (5.21x)
CineBench R10 64-bit – single thread	4679	5202	6057
CineBench R10 64-bit – multi-thread	10585 (2.26x efficiency)	11337 (2.18x)	13413 (2.21x)
Everest Read	9702MB/s	10596MB/s	11641MB/s
Everest Write	7595MB/s	8474MB/s	9733MB/s
Everest Latency	80.3ns	78.2ns	69.9ns



MSI P55-GD85

A shock we were not expecting.

Street Price TBC Supplier MSI
Website www.msi.com

Specifications Socket LGA1156; Intel P55 chipset; ATX form factor; 2x PCIe x16 (2x8 w/ Crossfire); 2x PCI; 2x PCIe x1; 6x SATA2, 2x SATA3; 2xUSB3 DDR3-1866+

We've looked at what is essentially all of MSI's P55-based range (or at least those that an enthusiast would buy), and what we've seen has been pretty good. Admittedly the P55-GD80 wasn't amazing, but the P55-GD65 was a nice little performer that eked out a pretty good 4.1GHz overclock. Knowing that, when we got the P55-GD85, all we expected was a simple feature bump – but what we got was something pretty darn surprising. First, though, let's have a wander around some of this board's more attractive features.

Sitting in the top-left corner of the board is the 8-pin ATX power connector, unhindered by big heatsinks and cramped components that we've seen in other designs, and it's pretty convenient for cabling. The PWM heatsinks that reside next to the LGA1156 socket are effective, and the large 8mm heatpipe that joins them is excellent at spreading the heat between the two 'sinks to get cooling performance chugging along nicely. While the socket doesn't have LGA775 mounting holes, this is only a minor point, especially considering that the socket itself is the heavy-duty LOTES version – and it's even been nickel-plated to look awesome.

Four DDR3 slots for dual-channel memory are placed next to each other just slightly too close for comfort; larger sticks will be pretty cramped, but two sticks will work fine. They're thankfully spaced far enough away from the socket to not interfere with heatsinks. The 24-pin ATX power connector lies beside a blue plastic wedge, inside which resides six hard points for measuring voltage across many different areas of the board. The spacious design ethos continues with the storage ports, providing six right-angled SATA 2.0 ports with an additional vertical port, as well as a right-angled IDE port. There are two white vertical SATA 3.0 ports also, which are RAID-able. Rounding out all the interesting features are two blue USB 3.0 ports and a single eSATA.

Hard power, reset and baseclock buttons are at the bottom of the board – hard as in they're literally etched into the PCB. A single press of a finger is all that is needed to use them, and for some reason they're just more fun than a normal button. To provide enough bandwidth with the P55 chipset and all the new 3.0 features, MSI has used a PLX chip that multiplies the PCIe lanes to provide more bandwidth, at a higher cost. Audio is from Realtek as normal, and the two PCIe slots are limited to dual 8x in Crossfire.

But getting back to what was really surprising about the P55-GD85 – its overclocking performance. Stock performance wasn't that great, and we had feared the worst when it performed poorly compared to the EVGA P55 FTW 200. However, once we hit the second OC Step the MSI board powered past the EVGA in every test, though lost it again at the third step – by a large margin.

We pushed the clocks on the i7 870 chip, and increased voltage at the same time, with initially frustrating results – a set voltage of 1.512v would result in an idle of 1.472v and a load of 1.40v, *until* we noticed that the "High Vdroop" setting was auto-enabled in the BIOS; deactivating this gave us a perfectly set voltage that increased under load slightly. We kept increasing speed, and eventually settled on 4.334GHz! These settings (197*22, 1.536v) required much more voltage to be stable, but this is the highest overclock we've squeezed out of this chip yet! Performance at this speed was actually slightly worse than at 4.114GHz (187*22, 1.45V) but it's still impressive.

In the end, whether you buy this or not will come down to the price, though we expect it'll be around $300. It's got headroom if you're in the mood for fun. **JR**

MSI P55-GD85

i7 870	133x22; DDR3-1600 8-8-8-24	150x22; DDR3-1500 8-8-8-24	175x22; DDR3-1400 8-8-8-24
PiFast	27.27s	24.15s	22.79s
wPrime 32M – single thread	40.388s	35.818s	33.886s
wPrime 32M – multi-thread	7.598s (5.32x efficiency)	6.755s (5.30x)	6.412s (5.29x)
CineBench R10 64-bit – single thread	4478	5077	5449
CineBench R10 64-bit – multi-thread	18127 (4.05x efficiency)	20248 (3.98x)	21820 (4.00x)
Everest Read	13537MB/s	14818MB/s	15603MB/s
Everest Write	10850MB/s	12238MB/s	14159MB/s
Everest Latency	51.5ns	46.0ns	45.8ns

Performance 92
Not great at stock, but it's an overclocking champ.

Value N/A
N/A

Features 90
Clever design, and handy inclusions.

Build 89
Some headaches, but otherwise it's built to be pushed.

Overall
Not the best P55 board ever made, but it's amongst the most impressive.

90%

GIGABYTE GT220

Like being nudged with a pinky toe.

Street Price $100 **Supplier** Gigabyte
Website www.gigabyte.com

Specifications 720MHz core; 800MHz memory (1600MHz effective); 15666MHz shader; GT216 core; 48 stream processors; 1GB GDDR3; 128-bit memory interface; dual slot PCB with active cooling

Card info www.techpowerup.com/gpuz/5f45e

If you've ever been to the beach at the time of the year when it's almost hot enough to go for a swim, but the water is still quite cool, and seen someone attempting to enter the water a toe at a time – then you'll come pretty close to what this card is like. It runs towards the specification box with all the excitement and glee of a sixteen year old driving on their own for the first time, but as soon as it touches the murky depths of serious hardware, it retreats faster than a French general in command of a janitorial squad tasked with cleaning up after the apocalypse.

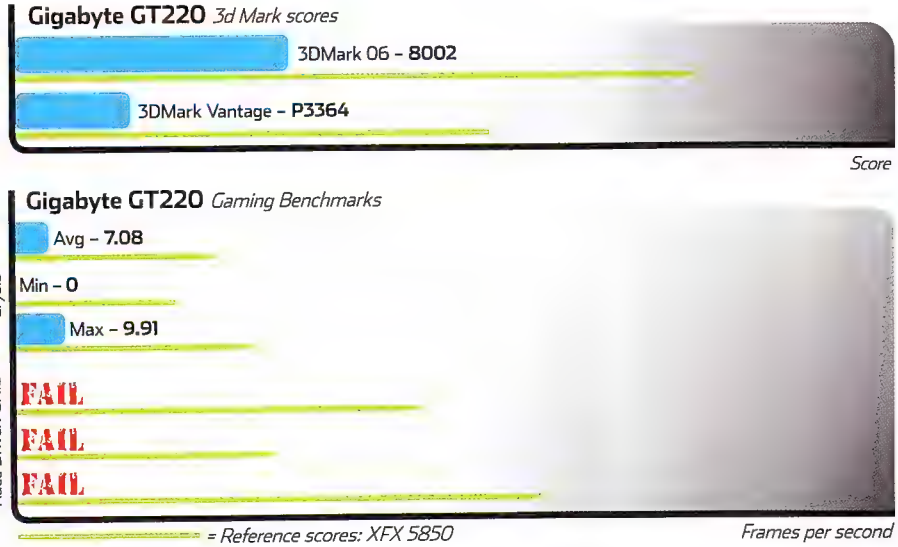
Running inside this card is the GT216, a core manufactured on a slim 40nm process that is a relatively small 100mm2 in size. With only 48 stream processors and a now-ancient 128-bit memory bus, the 1GB of GDDR3 memory is one of the few saving graces of this card. What also helps keep the card afloat is the factory overclock that's been applied to the core, an increase to 720MHz (95 over reference), though memory speeds only receive a teensy boost and sit at 800MHz. In all, nothing too exciting, with a price only a few bucks shy of the GT240 – a card with double the stream processors.

Physically this card is pretty standard low-end fare, offering HDMI, DVI and VGA connectivity in a dual-slot form factor. The PCB is a slightly deeper blue than traditional GIGABYTE colours, but is pretty short and will fit in pretty much every case out there. The heatsink that cools the core is as simple as they come, consisting of a large lump of aluminium that has been strapped to the card, complete with large fan. There's a plastic shroud around the card that guides airflow somewhat, and though the heat is not exhausted outside the case, it really isn't a problem with a maximum TDP rating of 58W (though this will be slightly higher thanks to the factory OC).

This was reflected in the idle temperatures of the card, at only 32 degrees with 53.5dBA generated. Load temperatures were excellent, at a max of 39 degrees and a slightly quieter 52.9dBA afforded by a small fanspeed increase that resulted in smoother air movement. There are no SLI nipples to be found on this card, and it can't be run in SLI mode through the PCIe bus, though you'd be mad to bother. At least power isn't an issue, with everything the card needs piped in through the PCIe slot.

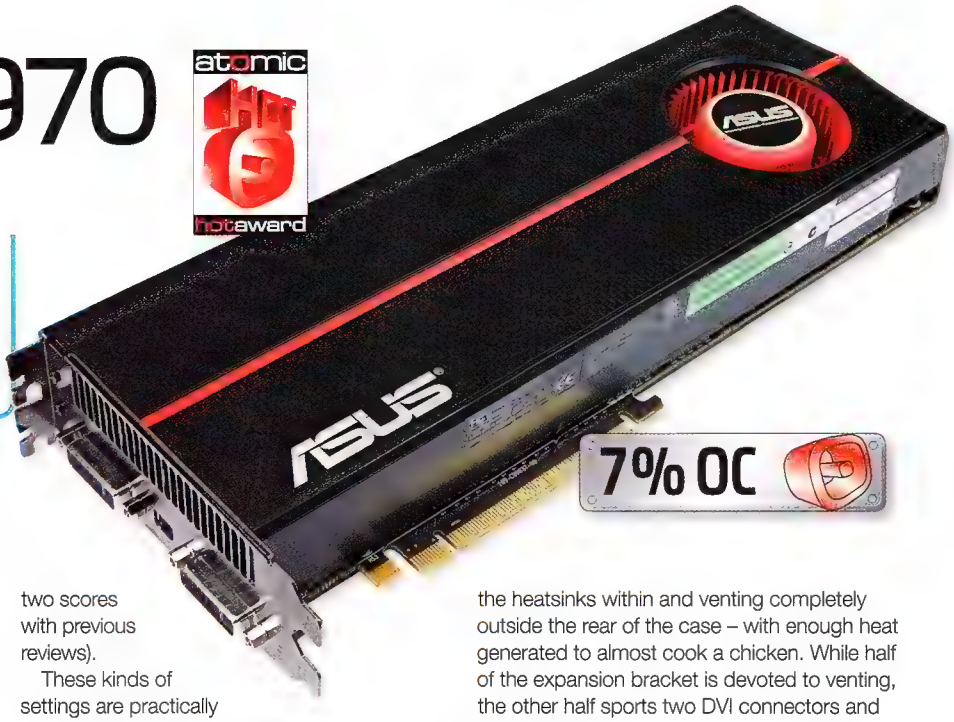
What flows back out of the card isn't very impressive, with gaming performance in Crysis proving that ultra-high-res is nigh-on impossible, and GRID proving completely unplayable. 3DMark06 netted a decent score, if we'd entered into a time machine and tested it two years ago, but by today's standards it is pretty pathetic. 3DMark Vantage shows much the same story, with the GT220 failing to impress.

Even when we overclocked the core to a max of 794MHz (+74MHz) and the memory to 843MHz (+43MHz) we could only generate a maximum 3dMark06 score of 8528. Once again, the disappointingly low tech specs are getting in the way, and there's not enough processing grunt here to justify paying this kind of price – especially with the GT240 and 5670 out there. **JR**



ASUS 5970

Power overwhelming.



Street Price $1000 Supplier ASUS
Website www.asus.com.au

Specifications 725MHz core; 1000MHz memory (4000 effective); dual RV870 cores; 3200 shader units; 2048MB GDDR5; 256-bit memory interface; dual slot PCB with active cooling; 8-pin, 6-pin PCIe power connector

Card info www.techpowerup.com/gpuz/4xnp2

When we first looked at the 5970 card back in Issue 107, it was a gigantic roaring beast with performance that quite frankly scared us a little. It was so fast that it broke our performance graphs, sending Designer_Dave spiralling further and further into madness and spurring a rethink of our testing regime. While the hardware platform hasn't changed (we still use an ASUS Maximus II Extreme alongside an Intel Core i7 965 at 3.2GHz), the settings have been boosted considerably. Crysis is run at 2560x1600 at high, GRID at 2560x1600 on ultra high with 8xAA, and both the 3DMark benchmarks remain at standard settings (so you can still compare these two scores with previous reviews).

These kinds of settings are practically essential for testing a card like this; the tech specs alone usually leave you breathless and weak at the knees. Essentially double a 5870, there are two RV870 cores manufactured on a 40nm process that each boast 1600 shader units, giving a total brainpower of 3200 units. There's one gigabyte of GDDR5 memory available to each core, which is mirrored – they don't add up to a total of 2GB. The TDP of this card sits at 294W, and power is supplied via a six and an eight pin PCIe connector.

Externally the card is pretty freakin' massive, and stretches well over the edge of a standard ATX mobo. It's encased in a carbon fibre-esque shell, complete with a single red racing stripe down the middle and a bright red acrylic 'ATI Radeon' badge along the top. It's very flashy, but if you've got it, you might as well flaunt it. A single squirrel-cage fan at the end of the card sucks in cool air, passing it through the heatsinks within and venting completely outside the rear of the case – with enough heat generated to almost cook a chicken. While half of the expansion bracket is devoted to venting, the other half sports two DVI connectors and a mini DisplayPort, great for those who need multiple screens.

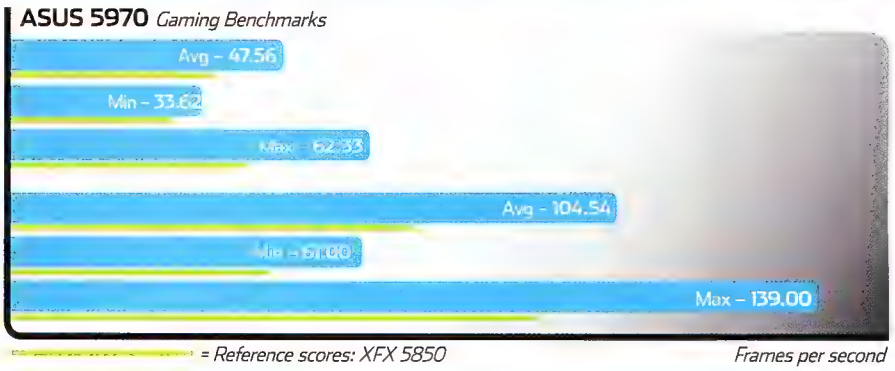
Performance is the ultimate end to a card like this, and it's certainly no slouch. Compared to the Manli 5870 from Issue 109, the ASUS 5970 boasts an impressive 47% per cent performance increase in average GRID fps, though Crysis' average frames increased by only 16 per cent. 3DMark06 saw a teensy-tiny rise of 547 points, hindered significantly by the processor speed of our test platform. Vantage shows an impressive boost however, rising 4840 points, giving it a 29 per cent increase in performance.

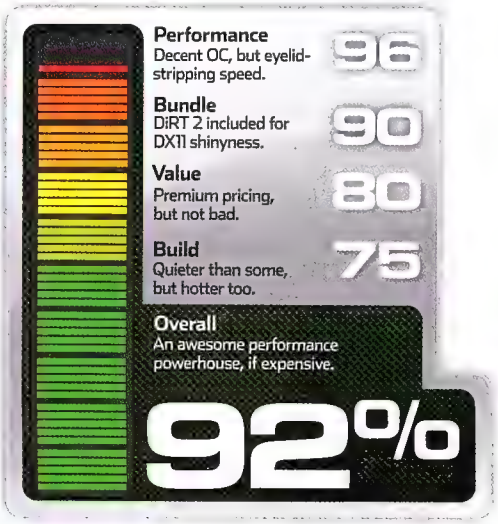
While the scaling isn't perfect at all times, the best part about the 5970 is that frames stayed *above* 60 in GRID. If the performance wasn't enough, ASUS has also thrown in a copy of DiRT 2 to a great inclusion of a recent game.

In all you'll wind up paying roughly $70 more for the ASUS variant of the 5970 on the market, but it's a price we'd willingly pay. JR

Too powerful for the ATX standard

ATI's engineers slapped two cores from the 5870 onto a single PCB, and all was good – except when they noticed the TDP of a single 5870 was 188W. With almost double the heat load, that reaches well over the ATX spec of 300W maximum, so they simply underclocked the cores and undervolted them slightly. The cooler is built to handle 400W of heat – so feel free to overvolt the cores again and get overclocking!





XFX 5670

Yet another budget-oriented card.

Street Price $128 **Supplier** XFX
Website www.xfxforce.com

Specifications 775MHz core; 1000MHz memory (4000 effective); RV870 'Redwood XT' core; 400 shader units; 512MB GDDR5; 128-bit memory interface; single slot PCB with active cooling

Card info www.techpowerup.com/gpuz/vsh6v

ATI's recent launch of graphics cards has definitely been an impressive one – in only a few months, the company's managed to flood the market with its DX11-capable 5xxx series cards, that range from performance that could cauterise wounds, to an affably affordable series of cheaper cards. The 5670 slots in roughly halfway between those two, and is a pretty darn affordable card that should offer some good value for money. At a low price of $128 it definitely hits a certain spot in your wallet, though there isn't any game included in the bundle to sweeten the deal.

The card itself is pretty swanky for what is typically a budget card price, featuring a PCB that has been dipped in black colouring and a single-slot heatsink that matches this colour scheme well. Thoughtfully, the GDDR5 chips on this side of the PCB are cooled by a heatsink that features simple pillars to improve surface area. The expansion bracket offers HDMI, DisplayPort and a single red DVI connector, and all three can be driven at once with Eyefinity.

A teensy fan in the heatsink makes an annoying 56.3dBA of noise, which increases to 57.5dBA at load, with temperatures ranging from 48-65. This is significantly higher than the Sapphire 5670 we looked at last Issue, putting the XFX behind in both noise and temperature performance. The heatsink is to blame here as well, as it is a simple block of metal with small fins.

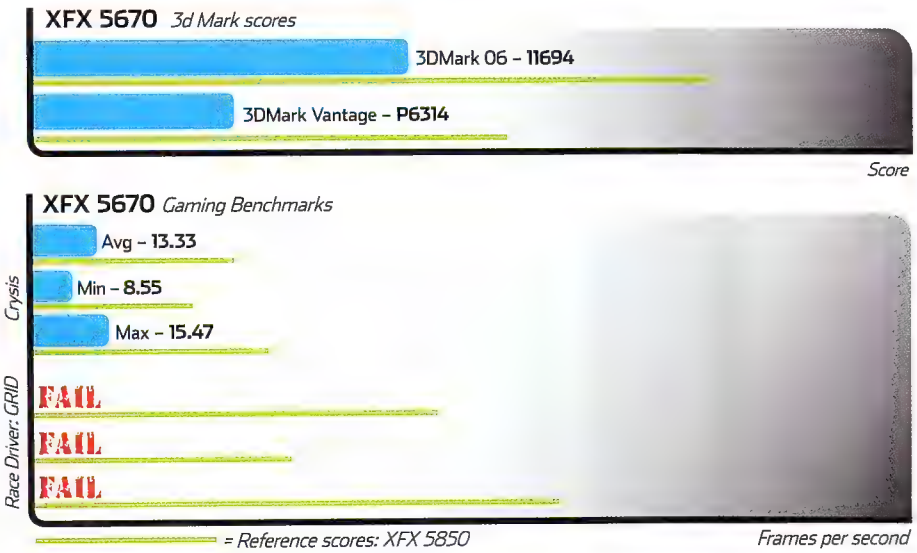
Even though the cooling wasn't quite as great as the Sapphire card, we still managed to eke out a maximum core clock increase of 15 per cent (to 895Mhz) and memory speed increase of 18 per cent (to 1175MHz). This isn't the best we've seen from a 5670, but it's nowhere near disappointing.

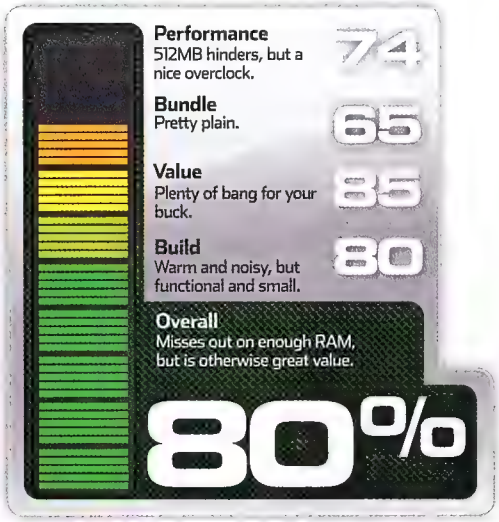
However, even though we could increase the clock of the core, there wasn't much we could do about the core itself. Built on a 40nm process, the Redwood XT core timidly shows off a collection of only 400 shaders, as well as a puny 128-bit memory bus. While technically cheaper to use, this bus is like installing a gigantic funnel at the end of a hose, and expecting a tonne of water to pass through it – you need a bigger hose to deal with the amount of work.

This became most evident in our GRID testing, as it failed to run at a framerate that would allow us into the actual test. Only 512MB of memory is partly to blame, but the memory bus also gets in the way. This is definitely a poor choice for ultra-resolution gaming, though for the price you wouldn't expect it to be a dream. Interestingly we found that Crysis performance was only slightly hindered by an average of half a frame compared to a 5670 with twice the memory, and both 3DMark programs didn't seem to miss the additional memory.

If you're still running games on a 17 or 19in monitor then this card will do well at medium settings, but don't expect big-screen high-setting performance from this beastie. There's nothing past a manual and driver disc included in the packaging, nor does this model support Crossfire if you want to add another down the track. The XFX version of the 5670 is an affordable entry into DX11, and with performance comparably higher than a GT240 it's one of the best midrange cards that money can buy. **JR**

15% OC





Zotac GTS250 Eco

Wait, we're going backwards?

Street Price $TBC **Supplier** Zotac
Website www.zotac.com

Specifications 675MHz core; 1000MHz memory (2000MHz effective); 1620MHz shader; G92b core; 128 stream processors; 1GB GDDR3; 256-bit memory interface; dual slot PCB with active cooling; 8-pin power connector

Card info www.techpowerup.com/gpuz/7vd3e/

Ultra-budget cards are great for basic office or HTPC duties, mid-range reference cards hit a sweetspot between value and performance for those on a limited budget, and those crazier cards like the 5970 in this issue are out there to provide pretty frames faster than an obsessive caffeine enthusiast in a photo lab. However, this card doesn't really fit into any of those categories

The G92b core at 55nm is the incredibly ancient (by industry standards) core running at the heart of the Eco, whose reference clockspeeds are usually 738MHz for a GTS250 – but here they're moved *backwards*, downclocking the core to 675MHz. There's a nice 1GB of GDDR3 memory included on an average 256-bit memory bus, but it's also been underclocked to 1000MHz, 100MHz lower than reference speeds. The reasoning behind this speed drop is to save power, of which Zotac reckon they save up to 40 per cent compared to reference cards, but it does come at a cost.

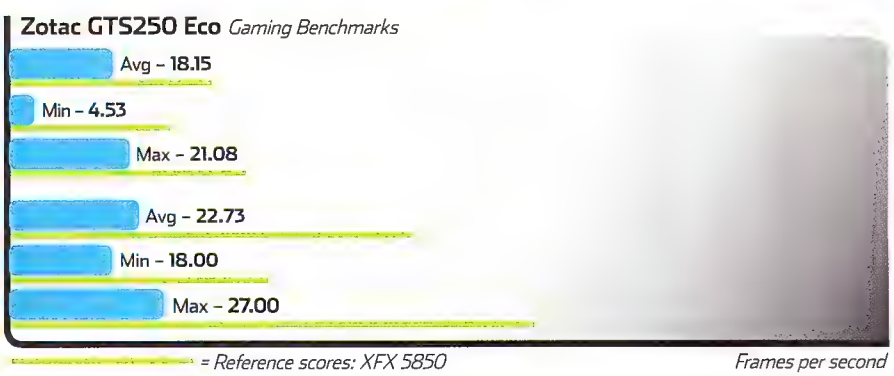
Performance in 3DMark06 is the most telling performance drop, losing almost a thousand points compared to a reference card. Vantage drops by almost six hundred, though both Crysis and GRID remain almost playable. If you notice anything strange about the performance – it's because it's almost there. 'But wait!', you say, "surely there are some temperature improvements for all this underclocking and whatnot?!". Well yes, but it's not breathtaking.

The card idled at 49 degrees with a noise generated of 51.9dBA, and increased by sixteen degrees to a maximum of 65 at 61.6dBA. This is a pretty slim increase (especially compared to the reference design's 28 degree increase), but it's *much* noisier. Exactly why it's noisier seems unclear, as the large-diameter fan should be able to turn slower to move more air. The culprit is probably the heatsink, a simple aluminium block with extruded fins that isn't amazing at removing heat quickly, causing the fan to react to the higher temperatures by spinning faster.

What is nice about the card, apart from the not-amazing heatsink, is the smoked plastic shroud that the fan is mounted to. It guides airflow out the expansion bracket's vents, as well as over the PWM at the end of the card, and keeps the memory chips cool at the same time. The PCB that everything is plugged into is coated in a very nice black colour, and it looks pretty slick. Even though it's a supposedly low-power-consumption model the Eco demands the use of an 8-pin PCIe power connector, though thankfully there's a dual 6-pin to single 8-pin connector thrown in for those with older power supplies. Plenty of memory onboard allows games with large textures, but gaming at high resolutions with plenty of antialiasing might cause slowdowns due to limited transfer speeds.

Even though this card has been factory underclocked (a concept that we're [i]still[/i] struggling with), re-overclocking it was a pretty disappointing experience. The core behaved itself until it reached seventeen per cent higher (788MHz), barely over the reference speeds of the G92b core. Memory speeds also didn't increase much, in this case only hitting five per cent higher (1054MHz) than factory speeds.

There's not much to sweeten the deal here either, with a disc full of CUDA demos thrown in without any full versions or games, and performance that just isn't there. If you need lower-powered graphics performance that is still better than ultra-budget cards, it's a decent choice, but for everyone else it's something to be avoided. **JR**

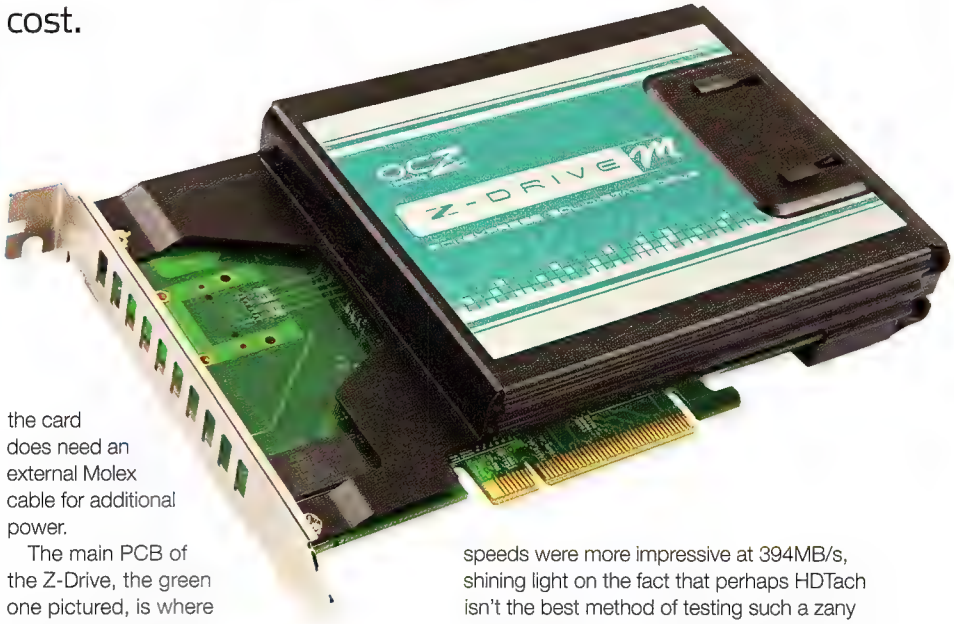


OCZ Z-Drive M84 256GB

Elegance in storage, but at a cost.

Street Price $1750 Supplier OCZ
Website www.ocztechnology.com

Specifications 256GB (238 formatted); 256MB cache; PCIe 4x interface; single-slot form factor; supports RAID



The Z-Drive boasts a storage capacity of 256GB at a gigantic price of $1750, which the clever ones out there will have noticed is exactly four multiples of a single 64GB SSD. In actual fact this is both perceptive and correct – the image below shows what is essentially four independent drives mounted onto two pieces of PCB. The individual chips that OCZ has chosen to use are Toshiba TH58NVG5D1DTG20, which is an otherwise incomprehensible string of characters. Delving back into the dark world of mathematics again (gasp) gives us four rows at four deep of flash chips that are 4GB in size, giving us an easy 64GB.

Performance-wise these MLC chips do hinder the Z-Drive somewhat, though in a comparison with individual flash chips (online here **http://www.flashbay.com/usb_flash_drive_read_write_speed.html**) we can see that the Toshiba chips used have decent 19.2MB/s reads, 12.9MB/s sequential write and 4.6MB/s random write – used together, all sixteen chips will provide the performance for the whole drive, and each four drives add up to a whole mess of performance.

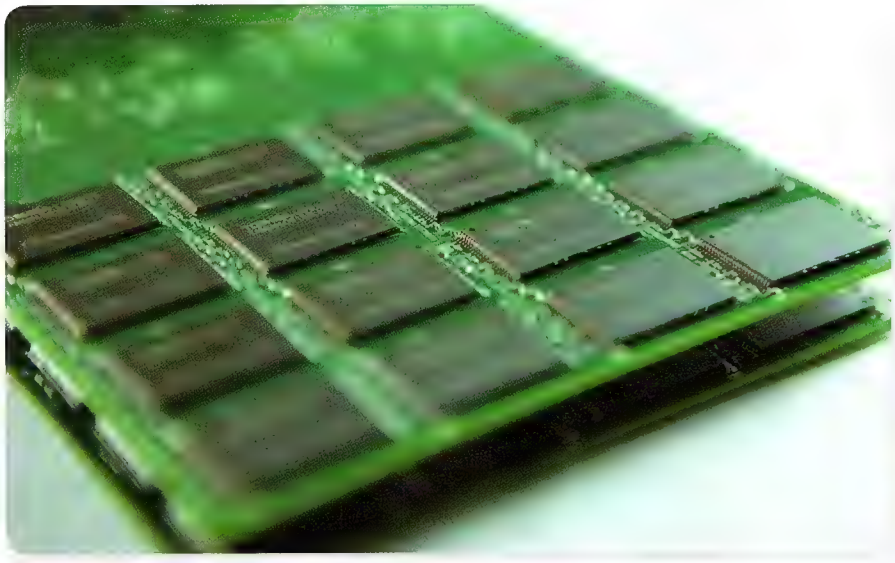
This is arguably the most elegant SSD-based storage solution we've ever seen. The four individual 64GB SSDs, installed on two large PCBs, simply slot into the large metal cover as seen in the product shot. Data connectivity is provided internally via a dual-sided SAS connector that doubles up with power, though the card does need an external Molex cable for additional power.

The main PCB of the Z-Drive, the green one pictured, is where the interface between hardware and software begins. Sporting a RAID controller, specifically the LSI Logic LSISAS1068E, this grants hardware RAID 0/1 capabilities for stripe arrays and mirrored arrays. The former gives access to the entire 256GB capacity of the four drives, while the latter sacrifices half the storage space for a redundant copy of the data. Bandwidth for the card is immense – eight PCIe lanes give up to 4000MB/s theoretical maximum transfer rates, so the interface is definitely not going to be a bottleneck.

However, not all is rosy in storagetown. We installed the Z-Drive into our X58-based testbed, and gave it a run through with HDTach – returning typical access speeds of 0.1ms, but a poor read speed of 127.8MB/s. Burst read speeds were more impressive at 394MB/s, shining light on the fact that perhaps HDTach isn't the best method of testing such a zany high-end product. We fired up IOMeter to see if performance was significantly better, and the results were much more consistent with the rating of the flash chips.

When reading files, we got random access transfers of roughly 10,000 IOPs, which isn't a significant increase over a standard hard drive. Random writes were also quite slow, and it was clear that juggling small writes over four drives was not the best use for this card. Transferring a large single file to the Z-Drive was phenomenal however; writing a single large 2GB HD video file from our Intel 80GB SSD at over 200MB/s, and reading a single large file from the drive gave us an easy 420MB/s sustained.

What this ultimately means for the Z-Drive is that it isn't the smartest choice as a system drive; not because performance is lacking (which it isn't), but because it simply doesn't compete in price to a single SSD. It's not a smart choice as a storage drive either, and you'd have to be insane to grab one of these for backing up files. Where this drive becomes a viable choice is for those editing gigantic video files, 5.1 audio with multiple sources at once, or those working with gigantic databases. So while Z-Drive fails to live up to the excitement that it sparked, it's definitely something that is worth coveting. **JR**



Overall
Great in specific circumstances, but not a game-changer.

80%

Luxa2 LM200 Touch

A stylish entry into the HTPC market from Thermaltake's new luxury brand.

Street Price $700 **Supplier** Anyware
Website www.thermaltake.com.au

Specifications 218 x 400 x 410mm (W x W x D); 8.8kg; 1x 5.25in drive bay, 2x 3.5in drive bays; 1x 120mm fan (rear); USB 2.0 x 2, IEEE 1394 Firewire, HD-Audio, multi-card reader; m-ATX compatible; silver extruded aluminium; iMon touch LCD, with iMON remote.

Gallery link www.atomicmpc.com.au/?166443

Luxa2 is the new, um, luxury brand from Thermaltake. And, according to Thermaltake, you can't spell luxury without lots of brushed aluminium... if you get our drift. Certainly, that's the main material used across the entire Luxa2 range, from their iPhone holders and laptop rests, and to this shiny new HTPC case.

Most media gear tends toward the matte black, in effort to fit in with most modern components. The LM200 eschews this level of obfuscation, however, and is proudly and shinily metallic – it's also about half again the height of most amps! The product's website claims it's the perfect height to fit in your entertainment unit, but we call shenanigans on that – it certainly doesn't fit in ours.

That said, it is a very striking design, and that height affords a most handy inclusion: an iMon touch screen LCD.

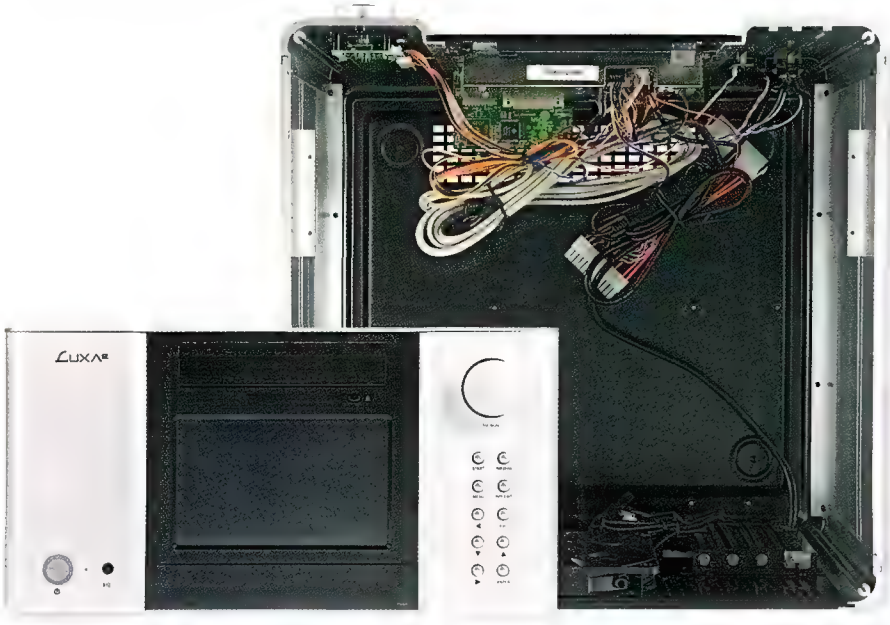
The one flaw in most HTPC setups, especially ones where your music collection is then backed up, is that you need to turn on the TV to take advantage of them. The iMon setup sidesteps that nicely, and it can even monitor your PC's internals, such as CPU temp and network usage. With the included remote control, this makes the LM200 just about an all in one solution. The front fascia houses a range of IO ports, multi-card reader and Firewire port – you'll be able to connect up just about any device or card, making for a versatile unit.

Annoyingly, though, when you take a look at the back of the case you see that the LCD is bit of a kludge installation. A passthrough cable snakes out the back of the case, to plug into your graphics card – hardly the most elegant of solutions, and not ideal in terms of cable clutter. Everything else is nicely wired up, however, but some careful cable-tying and such will add a lot the machine's airflow. There's only one 120mm fan serving as an exhaust, and a quiet one (rated at 17db) at that, so you'll want to give it as much help as you can.

But while the design is idiosyncratic, and the internal cabling a little odd, one thing that cannot be faulted is the LM200's build quality. With practically every surface made from 5mm aluminium, not only is the case fiendishly sturdy (and heavy, even without components), it's quiet too. The heavy materials naturally dampen sound, and all panels are nicely screwed down – a nice touch if you want to take it totally apart for some aftermarket modding. The upper panel is rubber reinforced, so that it snugly sits on top of the unit, and is vibration free. All the controls, too, from the dial to the various buttons and doors, feel smooth and well-constructed.

But boy... you really pay for all this. At $700 this is an expensive enclosure –for that kind of money you could almost put together the bare bones of a HTPC. Combined with the unit's height and design, this leaves the LM200 in an odd niche. It's undoubtedly well-made and featured, but simply too expensive for most.

DH



Build 80
Solidly made, but oddly designed.

Value 68
One of the more expensive cases on the market.

Cooling 75
Could maybe use one more fan...

Features 90
Everything, and a tiny kitchen sink to boot!

Overall 73%
A mixed effort, and slightly too expensive.

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Lian Li PC-B25F Blue Ring

Lian Li switches gears for its latest case – good move or bad?

Street Price $300 Supplier Mittoni
Website www.lian-li.com

Specifications 210 x 495 x 490mm (W x H x D); 3x 5.25in drive bays, 6x 3.5 in drive bays; 2x 120mm fan (front), 2x 140mm fans (top), 1x 120mm fan (rear); ATX & m-ATX compatible; E-SATA, 2x USB2, HD+AC97 Audio; black aluminium.

Gallery link www.atomicmpc.com.au/?166743

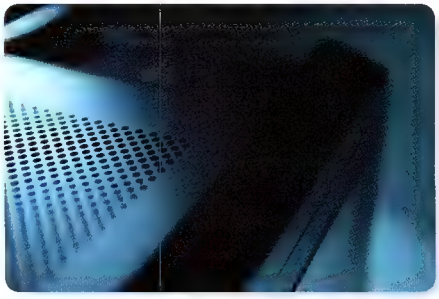
Atomic's love affair with Lian Li goes back to the very first issues, when we lovingly encased one of their brushed aluminium cases in a solid block of ice for an early cover shot. Back then, the no-nonsense styling and practical design set our hearts aflutter, and until recently, Lian Li's always had a place in our hearts. But the new PC-B25F looks, on the surface, like the case maestro is setting its sights a mite lower these days.

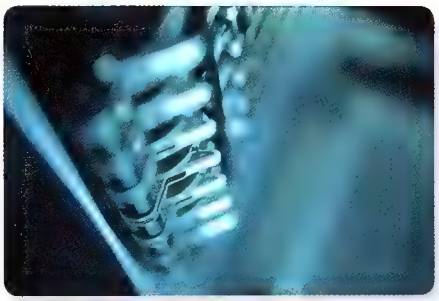
As some of our readers pointed out in the gallery above, a lot of cases are starting to look awfully samey, and the baseline a lot of designers seem to be cribbing from is Antec's popular P182. We can see the similarity, especially in the raised bevel surrounding the

case's IO ports. This look-alike syndrome certainly doesn't help the Blue Ring; internally, the bare aluminium looks a touch plain, which doesn't help either. But what really leaves us with reservations are the similarities between this case and the last Lancool we reviewed, the Dragonlord. More on that later.

The Blue Ring is pretty well cooled – two fans front and top, and one rear, which makes this a fine case for air-cooling an overclocked rig. Two rubber grommets in the case's rear also support more complex water-cooling loops, though we maintain that you're still better off sticking to an entirely internal loop. Expansion cards are secured by the tool-less design that both Lian Li and Lancool have been boasting for about six months, and one that we think is the best of the breed. HDDs are similarly treated to a simple single-screw design that cleverly locks all drives in place.

There's a good eye to keeping your rig quiet, too. The PSU rests on two rubber strips, and





all the fans feature rubber O-rings that not only dampen fan vibration, but also make fan removal a tool-less job as well – great if you need to clean your fans of cat hair or random grease often. The upper panel is actually an easily popped-out fascia that reveals the fans and some other cabling. It's a very neat design.

The motherboard backing plate, while not removable, at least has a cutout so you can mess about with coolers without removing the entire board. There's even a selection of pre-installed risers, which takes at least one fiddly task out of your PC building.

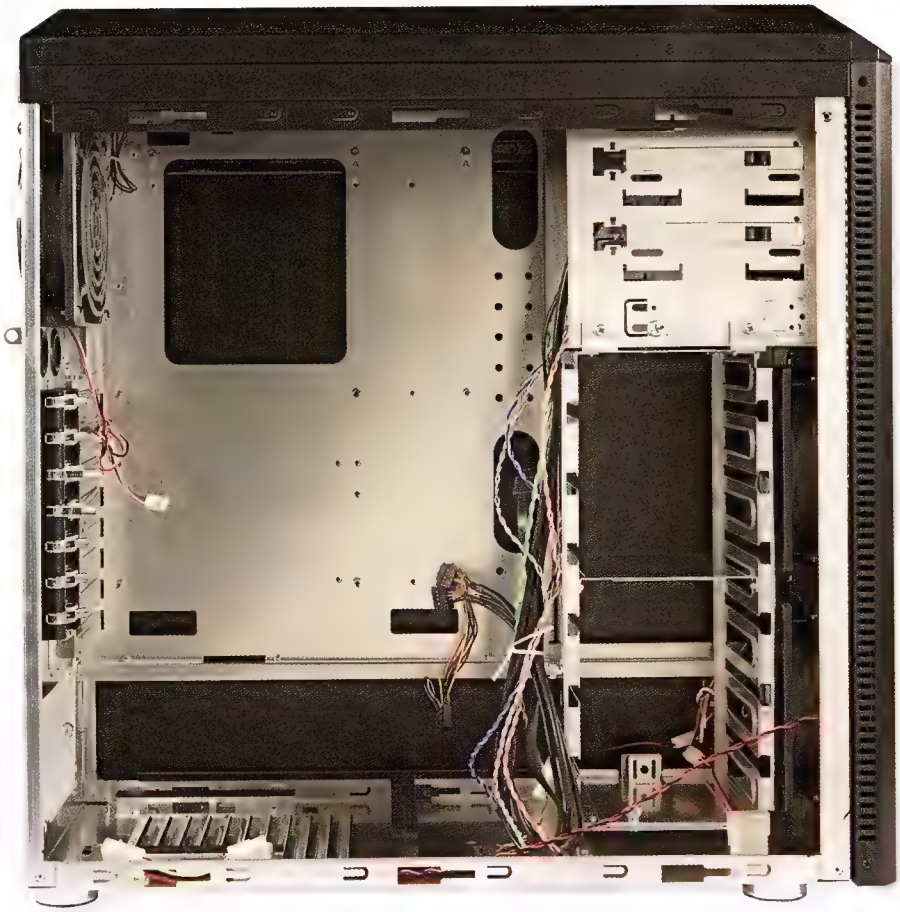
The looks from the outside are plain, but unmistakeably Lian Li. Brushed aluminium is the order of the day all over the case, with the exception of a plastic plate surrounding the usual IO suspects and the power and reset buttons. These buttons themselves are solid, and have a pleasing, if shallow, action.

And we kinda dig the blue ring that gives the Blue Ring its name – a simple circular LED that lights up when the power is on. The only issue is the years of negative reinforcement that the Xbox 360 has forced upon us regarding brightly coloured circles of any kind.

In pretty much every respect, the Blue Ring is very much an upgunned version of the Lancool Dragonlord, and it'll cost you a good hundred dollars for the extras. It's not surprising to see the similarity of course – Lancool is Lian Li's 'budget' brand. But we can't quite see where the value starts...

The extra C-note gets you two more fans, and an extra 3.5in and 5.25in drive bay. Otherwise, the cases offer the same tool-less design, and largely similar looks – the Dragonlord even has a black interior, which beats the plain metal of the Blue Ring hands down. If you need those extras, this is a good choice – and it's a good case, don't get us wrong! But the Dragonlord is just about as good, and a quick look on StaticICE shows it's dropped in price to as low as $160 if you know where to look.

This is just one of those rare cases (no pun intended) where the budget offering beats the premium on pretty much all counts. **DH**



Build 86
Solid, and very quiet.

Value 81
A good price for what you're getting.

Cooling 90
All the fans you could want.

Features 92
There's a lot to like under the hood.

Overall
A good case by itself, but it compares poorly to some budget offerings

84%

Coolermaster CM690 II Advance

Is this a justified upgrade to a popular chassis?

Street Price TBC Supplier Coolermaster
Website www.coolermaster.com

Specifications 214.5 x 511.8 x 528.8mm (W x H x D); 1 x 140mm fan (front intake); 1 x 120mm fan (rear exhaust); 1 x 140mm fan (top exhaust); 4 x 5.25in drive bay (external); 6 x 3.5in drive bay (internal); ATX, M-ATX; Steel construction, 9.56kg

Gallery link www.atomicmpc.com.au/168048

The original CM690 case was – and for many, still is – one of the first affordable cases that didn't skimp on either cooling or room. Even if you threw dual graphics cards in there along with an overclocked CPU, the case gobbled them up and was hungry for more. It also only cost around about $130, which is pretty damn cheap for a relatively enthusiast-grade chassis. Coolermaster has recently announced the CM690 II Advance, but while we don't have a price on this yet, it definitely brings new things to the table. The question is, are they things that you're going to want to eat?

The fascia of the Advance is incredibly similar to the original design, with only a few ruffled plastic flares to the side of the Coolermaster badge to tell them apart. The same four 5.25in bays make a showing, and the entire front is constructed from a mesh with (very thin) filter behind. A single 140mm fan sucks in air; and the LED lighting is even controllable via a button at the top of the case. Power buttons are solid, and Coolermaster's external SATA HDD dock makes its first appearance, confusingly named the X-Dock. It clicks down, revealing a ramp that leads into a SATA port, but hides it when you're not using it. Sort of clever, and handy for those who don't bother with enclosures.

The sidepanels on either side remain the same, with the left-hand panel supporting the installation of up to two 140mm cooling fans, and the right-hand panel supporting a 15x80mm fan that blows against the rear of the motherboard. What is noticeably different is the paint that has been applied – it feels very tough, isn't prone to fingerprints, and gives a decidedly heavy-duty persona to the case. The rear of the case is very similar to the original design, sporting a PSU bay at the bottom and a large exhaust fan, but there's also an extra vertical expansion port that lies along the other seven horizontal ports. It's handy for fan controllers and other devices, but Coolermaster's thrown its think tank some cookies and they came up with a very novel addition that we haven't seen outside Lian-Li.

What can best be described as a wedge of metal with large plastic teeth, the apparatus screws to the additional expansion slot and lies across the top of your graphics cards. In addition to holding them securely in place at all times (great if you're ever LANing), you can also install a slim 15 x 80mm fan into the bracket, providing some direct cooling. While it won't work with cards wider than dual-slot, it's still a very thoughtful inclusion.

Making a reappearance in the case are Coolermaster's tooless hard drive caddies, which wrap snugly around a drive and simply slide in; matched by the 5.25in catches that secure ODDs with a single flick of a switch. There are rubber pads that the PSU sits on to minimise vibration, wide cutouts in the mobo tray for cabling (including the 24-pin ATX cable), and every meshed intake is filtered – and the huge rubber feet that the original case was so well known for make a welcome reappearance.

This an improvement over the original in every way, and if you take the plunge you'll be happier than a pig in mud. **JR**

Build 92
Filtered, all-black, sturdy and solid.

Value N/A
N/A

Cooling 85
Some nice included fans, but great potential too.

Features 94
Plenty of thoughtful ideas.

Overall
We're very happy with this case, and you will be too.

91%

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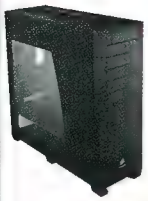

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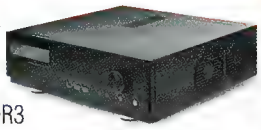
MANTIS HTPC



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The BIG PICTURE

Benny Har-even throws light against a wall to bring you the best of the best.

When it comes to gaming and movies, it's a given that bigger is always better. So why limit yourself to a 24in or even 30in display, when you could go for something really big? If you consider that a 103in plasma TV will set you back around $70,000, spending a sliver of that for an image around the same size has to be pretty good value. And that could only mean buying a projector.

Luckily, there's never been a better time to buy your first projector. When full HD 1080p projectors arrived on the scene a couple of years ago, they cost the proverbial (and in some cases literal) arm and leg, but they've now dropped dramatically in price.

While you can still spend an astronomical sum on a projector, in this Labs test, we've kept a lid on the maximum price, topping out at just over $3800.

This will buy you a truly cinematic image but, as we discovered, some very decent projectors are available for less than half that. If you're on a tight budget, 720p projectors can now be had for just over $1000 and still deliver super-sized thrills. Either way, one of these projectors will be just right to get you started.

How We Test

When looking at our collection of projectors, there were a number of elements we had to bear in mind.

The first was the design of the chassis, and how easy it was to set up and achieve a correctly shaped picture. We didn't emphasise looks, as while the aesthetics will have an impact, you'll hopefully spend your time looking at the projector's output and not the unit itself.

We were more interested in features such as lens shift, which enables the lens to be moved around to fit the image on your screen, rather than having to position the whole projector in the optimal place.

The closer the projector is to the screen, the tougher it is to project a large image, so our test environment was a challenge in that regard. We projected onto an 82in, freestanding pull-down Optoma 16:9 aspect ratio Panoview screen from a desk 3.3m away.

As well as lens shift, we looked for effective aids such as extending feet and stands that really help with the setup process.

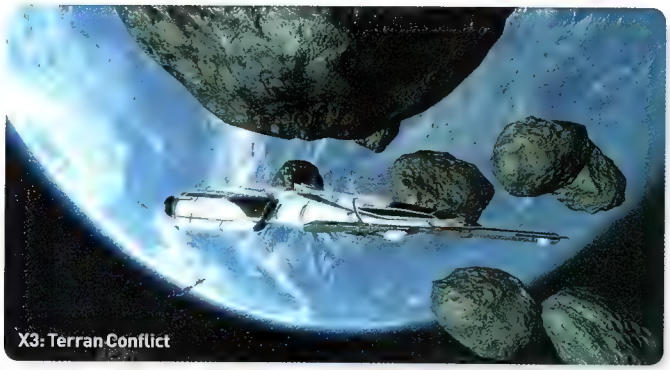
We were also looking for features inside the projector, such as digital keystone correction; while this should only be used as a last resort, it can help to obtain the correct picture shape when it isn't possible to position the projector in just the right place.

While action movies and games are usually loud and booming affairs, there might well be quieter moments, so we took note of whether the fan noise was obtrusive. The number and type of inputs are also important factors; if you aren't connecting via an AV amp, you'll spend half your time switching cables.

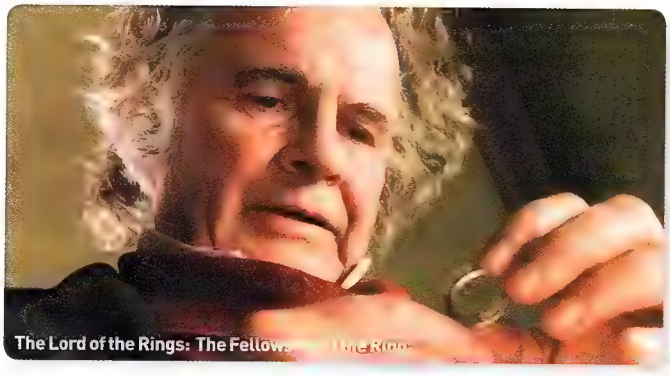
The main consideration, though, is image quality. You can deal with awkward setups, but if the picture isn't up to scratch, you're stuck with it. As such, we examined the options for adjusting the picture.

One thing we learned from this roundup is that the quoted contrast ratios and brightness figures need to be taken with a pinch of salt. While the contrast ratio is important, manufacturers can achieve high figures with very bright, over-boosted pictures that are actually unwatchable.

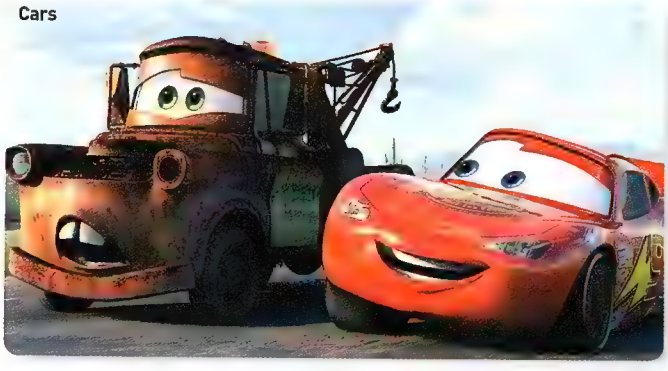
As such, we ran seven separate real-world tests to determine how the projectors performed. First, we hooked each projector over HDMI to a machine fitted with an ATI Radeon HD 4850. All the tests were run at the projectors' native resolution – either 1,280 x 720 (720p) or 1,920 x 1080 (1080p). The first hurdle each projector had to pass was to display the test images at www.lagom.nl/lcd-test. We paid particular attention to the contrast test (which shows how the projector handles RGB colour scaling), the sharpness test, the black level and white saturation tests (to determine if they can display darker and lighter areas and how cleanly they can do this) and the gradient test.


X3: Terran Conflict


Serenity


The Lord of the Rings: The Fellow

Cars



We also looked at how the projector handled large blocks of colours – purple, red and green. We used a rolling demo of the game X3: Terran Conflict, for a good test of black levels, colour rendition and motion. The next game we played was Crysis, where we used the extensive greenery of the grass, trees and bushes to evaluate colour performance, and played the game to test fast motion.

Finally, we played the 1080p QuickTime trailer of Serenity to see how it handled motion and shadow detail, and to find out how it coped with the noise from this relatively low bit-rate file.

We then hooked up a PlayStation 3 and played three demanding discs. The first comprised two scenes from our venerable test DVD, The Lord of the Rings: The Fellowship of the Ring.

There were two particularly demanding scenes: the intense white snow, as the Fellowship crosses the mountain pass Caradhras; and the scene when Frodo rolls and drops the ring, which is good for testing skin tones and the visible detail in the hair and clothes, making it ideal for evaluating upscaler performance. Black levels are also put to a stern test when Gandalf lights up his staff in the pitch black as they enter the Mines of Moria.

After that, we used the Pixar movie Cars to test bright intense colours, and finally we tested native HD performance and black levels with the opening scenes of The Matrix on Blu-ray.

Panasonic PT-AX200E

Easy to set up and quiet, but this model is starting to show its age.

Street Price $2050 **Lamp type** LCD
Manufacturer www.panasonic.com.au

The Panasonic PT-AX200E is an increasingly rare beast – a 720p projector. It's a short throw unit and can project a 40in image from only 1.2m. This meant it was able to fill our 82in test screen from 3.3m with no problems, although as it's a fairly large projector, you'll need to think about where to locate it.

It's very easy to set up, thanks to a combination of extending feet and a simple lens shift mechanism. A joystick allows you to move the image horizontally and vertically; once optimised, it can be locked in place.

Focus and picture size are controlled by adjusting the lens ring, so you'll need to be able to reach it to make adjustments. It's very well equipped with inputs, as it has two HDMI ports, component, S-Video, composite and D-Sub.

Delve into the menus and you'll find a generous range of options for optimising picture quality: as well as contrast and brightness you can adjust tint, sharpness and colour temperature; and under an advanced menu setting, adjust gamma, red, green and blue individually. Adjustments can be saved to one of eight profiles.

There are seven image presets – Normal, Dynamic, Vivid Cinema, Cinema 1, Cinema 2, Natural and Game. In a darkened room, we eventually settled on Vivid Cinema, as it gave the best balance of punch and detail in darker areas for film content, but for games such as Crysis, you'll want to employ the Game setting.

One of the disadvantages of an LCD projector is that you can sometimes see the LCD grid array, as we spotted while watching the Serenity trailer.

There's an auto iris option, which boosts contrast by reducing brightness in dark scenes, but the jumps in brightness meant that it was too distracting for regular use. However, with it turned off, we found that the native black level wasn't quite up to par. Equally, it struggled with resolving the finer details in bright scenes.

While the PT-AX200E is very easy to set up and configure, its image quality isn't quite good enough for regular use, and it's also fairly expensive for a 720p projector. BH

BenQ W600

The cheapest projector here, but it's a little noisy.

Street Price $1200 **Lamp type** DLP
Manufacturer www.benq.com.au

The BenQ W600 stands out as being the cheapest projector tested, costing just over $1200. No surprise then that it's a 720p model.

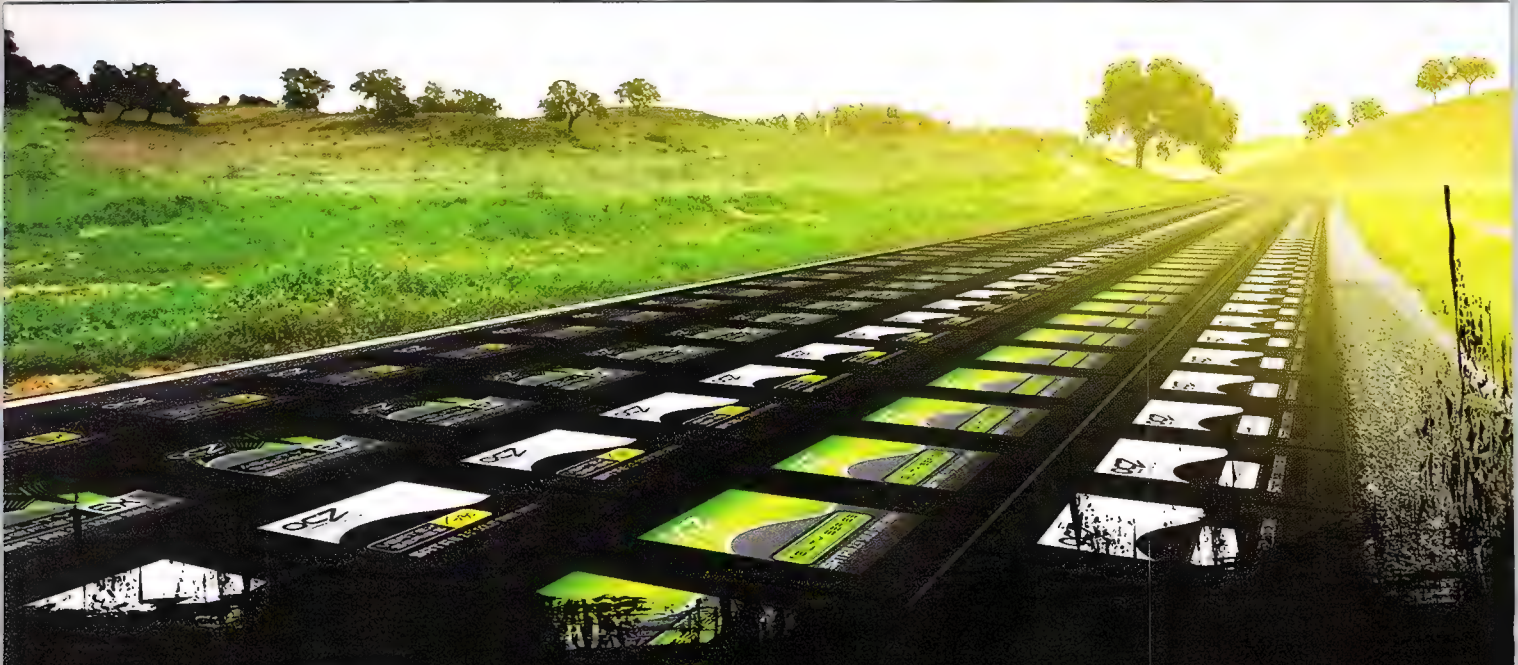
It's a DLP projector, and very compact, which makes it suitable for carrying around with you or simply keeping it in a cupboard for occasional use. DLP projectors tend to be less flexible than LCD models, and setting it up proved to be a problem. The W600 has a central single foot at the front and a stand that can be raised at the rear, but we had trouble getting a correctly shaped image and were forced to use an old copy of Atomic to get the image to look straight on our screen.

Another issue was the fan noise, which we found to be intrusive compared with the other projectors. There was also noticeable light leakage from the chassis and an irritating delay when switching between different inputs.

In the menu, you'll find Standard, sRGB, Cinema and Dynamic image presets; with the latter punching out a very bright image thanks to a powerful 2,600 ANSI lumens lamp. This means that the W600 is ideal for watching with the lights turned on, but is best avoided in the dark, as image detail is washed out. The colour-boosting BrilliantColor tech can be turned on or off, and we preferred it on when gaming. You can adjust the hue, saturation and gain of each colour.

Images on the W600 appeared bright and smooth, although they lacked the pop that other projectors provide, which was particularly apparent in Crysis's green jungles. This can be put be put down to slightly poorer black level performance than the best projectors, with shadows and dark areas of the screen lacking fine detail. In movies, the image was filmic and again very bright, but some image noise was apparent.

Although the W600 is very cheap for a current-generation 720p projector, its noisy fan and poor black detail means BenQ has arguably cut too many corners to make it worth buying. If you're in the market for a budget 720p projector however, this will serve your needs. BH



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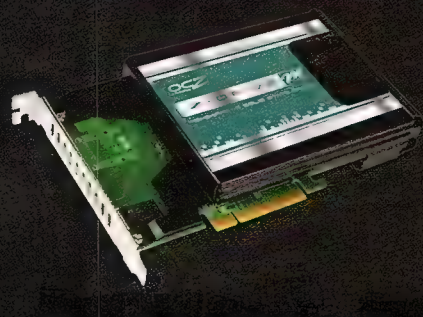

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EPSON EH-TW450

Proof that 720p LCD projectors can still be competitive.

Street Price RRP$1699 Lens type LCD
Manufacturer www.epson.com.au

With the prices of 1080p projectors dropping, it may seem that it's no longer worth buying a 720p projector, but Epson's EH-TW450 is here to prove us wrong.

For a start, it will appeal to those who need portability and want something small enough to carry around with them. Handily, Epson even supplies the EH-TW450 with its own carry case.

The EH-TW450 isn't as fully featured as some projectors though – it only has a single HDMI input, and in keeping with the portable theme, all analogue connections are clearly labelled on top. While the EH-TW450 has an integrated speaker, it's about as high-fidelity as an old tin can.

To the left-hand side of the lens, there's also easy access to the dust filter; like all LCD projectors, this will require cleaning out at regular intervals. With a lumens rating of 2,500, the EH-TW450 is very powerful. It's designed to be used with the lights turned on – perhaps more geared towards sport, should you be into that sort of thing. As a result, the remote control lacks a backlight, so it can be difficult to use in a darkened room.

However, there's also a game-specific mode, which keeps the image bright but not overly garish, which is important in a game such as Crysis. Image quality is generally good out of the box, although we suggest switching to the Eco mode; on Normal, the cooling fan was far too loud. Upscaling from DVD was good, with detailed images, but there was some greying over in darker scenes.

One issue we found was that, in order to fill the screen, we had to move the projector closer to the screen than any of the other models, and there's no lens shift. As such, it was tricky to get the focus sharp. We also found images were a touch soft, which is a result of a smoothing filter that's used to stop the LCD pixel grid being visible – a consequence of the 720p resolution.

The EH-TW450 is clearly the best 720p projector, but is exclusively sold through Harvey Norman stores and may prove tricky to source. If you can find one however, it's well worth considering. **BH**

Feature Table

	BenQ W600	Epson EH-TW450	Panasonic PT-AX200E
Price (inc VAT)	$1200	$1699	$2050
Lamp technology	DLP	LCD	LCD
Native resolution	1,280 x 720	1,280 x 720	1,280 x 720
Brightness (ANSI Lumens)	2,600	2,500	2,000
Claimed contrast ratio	3,000:1	3,000:1	6,000:1
Lamp life (typical)	2,500 hours	3,000 hours	1,800 - 2,000 hours
Fan noise (dbA – Normal mode)	34dbA	29dbA	25dbA
Inputs	2 x HDMI, component, D-Sub, S-Video, composite, RS-232, USB	HDMI, component, D-Sub, S-Video, composite	2 x HDMI, component, D-Sub, S-Video, composite, RS-232
12V trigger	8	8	8
Speaker	4	4	8
Lens shift	8	4	4
Keystone correction	4	4	4
Kensington lock	8	8	4
Throw distance	Not stated	0.91-10.84m	1.2m - 12.4m
Image size	26-300in	33-318in	40-200in
Zoom ratio	1.15:1	1.2:1	2:1
Throw ratio	1.51-1.76	1.68-2.02 (60in screen)	Not stated
Weight	2.7kg	2.3kg	4.9kg
Dimensions (W x D x H) mm	306 x 216 x 93	296 x 228 x 77	395 x 300 x 112
Warranty	1 year collect and return, 2nd/3rd year RTB	3 years	1 year

Mitsubishi HC3800

Mitsubishi makes virtually everything, but this projector fails to impress.

Street Price $2900 Lamp type DLP
Manufacturer www.mitsubishielectric.com.au

Not long ago, you'd have bitten off someone's arm for a 1080p projector costing less than $3000, but the HC3800 is actually the most expensive 1080p DLP projector in this roundup.

As a DLP projector, the HC3800 is more compact and lightweight than the LCD projectors. However, it emits lots of heat and light from its large cooling grilles. We also found the fan to be overly noisy, especially in Normal mode.

Another issue was setup; as there's no lens shift, we had to resort to balancing the HC3800 on books and using the keystone correction to fill our 82in screen. Another downer is that there's only a single HDMI input, which could be an issue if you don't have a home cinema receiver. It has component, D-Sub, S-Video and composite inputs, though, and a 12V trigger for synchronous screen action.

The remote control and the menus are notable for being the ugliest on test, with the latter featuring tacky icons and red highlighting that makes it very difficult to determine which option is being selected.

The HC3800 is a mixed bag image quality-wise too. In the dark, the Cinema mode provided the most suitable image for watching films, but at its default setting, it fared poorly in the Lagom contrast test. We had to drop the contrast to a staggering -19 to make all the red steps visible – and only after we played around with the settings were we able to get an acceptable overall balance.

Black levels could be rated as merely acceptable. In the dark opening scenes of The Matrix, it struggled to find detail and pans weren't as silky-smooth as with the LCDs. In the brighter parts of The Lord of the Rings DVD, though, it produced a detailed and cinematic image. The primary colours in Cars were emboldened by the BrilliantColor setting, without the noise that afflicted the BenQ W1000.

While it's possible to achieve good results with the HC3800, considering its setup faults, high pricetag and unappealing interface, there's just too much strong competition for us to recommend it. **BH**

Overall
Expensive, clunky and noisy; three strikes.

70%

Sanyo PLV-Z700

A great 1080p projector, with a few drawbacks.

Street Price $2730 Lamp type LCD
Manufacturer www.sanyo.com.au

Encased in a cream oblong chassis with rounded edges, the Sanyo PLV-Z700 is a plain-looking projector. The lens is mounted behind a motorised cover that slides open when it turns on, which is great for impressing friends. It's therefore a shame that there's no 12V trigger to make a motorised screen come down at the same time.

Based on LCD technology, the Sanyo is easy to set up. There are two extending feet at the front to raise the lens and there are lens shift controls running down the left-hand side. These aren't very precise, but once you have the image right, you can lock them down. Focus and zoom are adjusted on the lens, which is located inside the chassis, making it awkward to reach.

There are two HDMI inputs, and unusually, two component inputs. The backlit remote provides direct access to each input and a range of picture options.

We were a little disappointed with the image quality out of the box. The Sanyo doesn't have the brightest lumens rating, and with the lights on, only the Dynamic setting had punch, although the Windows desktop still proved tricky to see clearly. Whichever preset we chose, the quick contrast test either gave the image too little brightness, or blew out the levels at the top end.

However, the menu is full to the brim with picture-tweaking options and if you spend time using them, the image quality can be greatly improved. You can set the lamp to adjust its brightness according to screen content, and you can have the iris adjust itself or leave it fully open. There are also controls to tweak black levels and gamma. Once tweaked, the Sanyo's performance was very good, with a smooth and natural image, while remaining whisper-quiet.

Unfortunately for the local Australian market, this projector comes in at almost $3000 – significantly more expensive than other regions. For that reason, we can't really recommend this projector, even considering the quiet design and motorised door. **BH**

Overall
Would otherwise be a nice budget choice, but is restricted by pricing.

72%

BenQ W1000

An affordable 1080p DLP projector, with some pleasing extras.

Street Price $1700 Lamp type DLP
Manufacturer www.benq.com.au

The BenQ is nearly double the price of its W600 sibling (see p53), so what do you get for your money? For a start, it has an eye-catching finish – a mottled white texture offset by the silver top-mounted control panel that gives it an expensive if slightly retro look. The backlit remote looks cheap but is perfectly serviceable.

The W1000 is also a 1080p DLP projector with a bright 2,000 ANSI lumens rating. It sports a healthy number of connections – two HDMI, component, D-Sub, S-Video and composite.

It also has a Type-B USB port for controlling via a PC, but Windows 7 couldn't find drivers for it, and there was none on the CD or BenQ website. A speaker and audio pass-through are present too, although it's debatable how useful these are.

Technology-wise, the W1000 features BenQ's BrilliantColor, which boosts mid-range colour and there's 10-bit processing for a wider colour gamut. The menu offers both basic and advanced settings, with options for adjusting colour temperature, gamma, hue and saturation.

These would all be meaningless if the image quality weren't up to scratch. Colour fidelity is a highlight for a projector at this price, with vivid colours in Pixar's Cars.

BrilliantColor dials things up a notch further when activated, but at the expense of pixel noise. In fact, this was one of the downsides of the W1000, and it could only be dialled down at the expense of shadow detail.

In Crysis, however, BrilliantColor was just what the projector doctor ordered, giving the leafy surroundings real punch. The unit also runs quietly in eco mode, which is a bonus.

However, there were quirks to the W1000. It's tricky to set up, as there's no lens shift, so we had to resort to keystone adjustments. Unusually though, when we switched to DVD, it wouldn't fill the screen, indicating that it lacks an integrated upscaler, so you'll have to rely on the source device for that.

Aside from that, if you can place the unit in the optimum position for the screen, and are happy to play with the many settings to optimise the image, the BenQ W1000 is a delight given its comparatively low price. **BH**

Epson EH-TW3500

A high-end LCD projector at a sensible price.

Street Price $2900 Lamp type LCD
Manufacturer www.epson.com.au

The Epson EH-TW3500 shows that it means business as soon as you take it out of the box – it's a large, imposing projector that's clearly aimed at more permanent installations. The design is pleasing to the eye and well thought out. Access to the dust filter, which will require regular cleaning, is made easy thanks to a removable flap at the rear.

Setting it up in our test room was a cinch, thanks to a lens shift mechanism via two dials set into the body. However, this wasn't as precise as the joystick on the Panasonic PT-AX200E. Focus and zoom are located on the lens itself, while the menu buttons are located on the left rather than on top. There's also a simple but effective remote control.

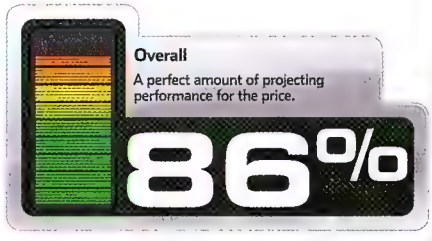
The EH-TW3500 boasts some advanced picture-tweaking options, as well as the usual brightness and contrast adjustments, such as colour temperature and skin tone. There are three levels of noise reduction to play with and no fewer than seven colour presets; Dynamic, Living Room, Natural, Theatre, Theatre Black 1, Theatre Black 2 and x.v.Color.

You can choose between Normal and Eco power modes, with the latter sacrificing ultimate brightness for longer lamp life. The fan was very quiet in both modes.

The EH-TW3500 projects a very bright, sharp and clear picture. In a brightly lit room, the Dynamic mode will ensure fantastic images from games such as Crysis, but in darker conditions, the Theatre Black 1 preset delivered the best result, delivering fantastically smooth and steady images that set it apart from similarly priced DLP projectors.

In the Lagom technical tests, the EH-TW3500 showed its class, with clearly delineated colour gradient steps, although if we were being picky, it had trouble at the top end. Grey scales were very smoothly handled, while colours were vibrant and skin tones were accurate – thanks mainly to a very good black level.

Moving to DVD, the EH-TW3500 did a great job of upscaling, creating fantastic cinematic images, while with The Matrix on Blu-ray, it simply sang. A great projector by any standard. **BH**



Panasonic PT-AE4000E

A functional-looking chassis, but this is a classy performer.

Street Price $3600 Lamp type LCD
Manufacturer www.panasonic.com.au

Although the PT-AE4000E is Panasonic's fourth 1080p projector, the chassis remains unchanged. Its angular shape contrasts strongly with that of the Sony, and its matt-black finish and fins put us in mind of a TIE Fighter, which is no bad thing.

Despite the large size it's easy to set up, thanks to two extending feet at the front. Dials for vertical and horizontal lens shift have a very precise feel to them, with both zoom and focus motorised and controlled via the squat remote control, so tweaking can be done when the unit is ceiling-mounted. The controls are also mirrored under a panel on one of the sides, if you're closer to the unit or have lost the remote.

The PT-AE4000E has three HDMI ports, plus component, S-Video, composite and D-Sub. There are also two 12V triggers for automatically activating a screen when the unit is turned on.

Switch it on and you're greeted with a bright picture. The solidity of the image compared with those of DLP models was palpable, so if rainbow noise is an issue for you then this is a godsend.

In the Lagom contrast test, the PT-AE4000E performed very well, although we felt that it was a close second to the Sony. The gradient test was very smooth but colours seemed less immediate. This was echoed in all the game and movie tests. The glowing words in the Serenity trailer, for example, were sharp and bright on the PT-AE4000E, but positively sizzled on the Sony. Equally, while the greens in Crysis were very satisfying, they weren't quite as lush.

The strength of the PT-AE4000E is its razor-sharp images, which are packed with detail – the fibres of Boromir's outfits and the decals on the racers in Cars on DVD are testament to a very good upscaler, while the HD images in the Matrix were superb. Overall though, we felt it was narrowly beaten out by black levels and contrast.

The Panasonic has tons of inputs and is very easy to set up, but it's worth stretching a little bit more to grab the Sony instead. **BH**

Sony VPL-HW15

An enormous projector, but the image quality is fantastic.

Street Price $3800 **Lamp type** SXRD
Manufacturer www.sony.com.au

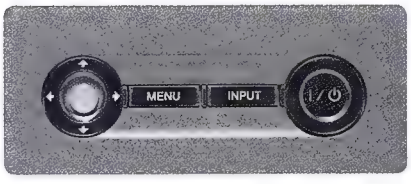
Of all the projectors in this roundup, the Sony VPL-HW15 stands alone in its choice of technology. Rather than DLP or LCD, Sony furrows a lone path with its SXRD (Silicon X-tal Reflective Display), which is Sony's variant of LCoS (Liquid Crystal on Silicon).

SXRD claims to have a greater native black level than LCD, and has none of the potential downsides of its rivals, such as DLP's 'rainbow effect' and LCD's pixel grid. Until recently, SXRD used to be the domain of very expensive projectors but with the VPL-HW15, Sony has brought the price down to a relatively affordable level at just under $4000.

However, if you're looking for a compact, portable unit then the Sony won't be much use. It's the largest projector on test, bulkier than a fully grown elephant seal. At least its bulbous curves and smooth plastic are easy on the eye. The long remote control with its cool blue backlight is also a cut above the rest and lets you make key adjustments without having to bring up the menu.

The menu system is clear and straightforward, and you can save any changes you make to one of three user presets, all of which are directly accessible from the remote. The remote will also let you control other Sony kit, and as you'd expect, there are advanced controls for individually adjusting the red, green and blue levels.

All the inputs run down the right-hand side of the case. An optical lens shift function is available via controls on the top of the case, and although this works well, the horizontal dial lacked precision. Setup is also assisted by two rotating extendable feet and a 1.6x zoom lens, which helped to fill our 82in screen from a distance of 3.3m to perfection. Should you need it, keystone correction is there too.



You can adjust the lens, and the VPL-HW12 also has adjustable feet.

Sony provides a good range of inputs.

The large case has no light leakage issues and the fan proved to be near silent in operation, although we could occasionally hear the movement of the iris as it automatically adjusted. The Auto Iris feature opens up the lens in darker scenes to boost low-level detail and was responsive enough for us to leave it activated.

On paper, the VPL-HW15 doesn't boast a high brightness level, as it's rated at only 1,000 lumens, but we were able to view the Windows desktop and view film content with the lights switched on and the Dynamic preset enabled. However, you'll want to minimise ambient light to achieve the best image quality.

Using the Cinema preset, the VPL-HW15 got off to a flying start, with all the colour scales in the Lagom tests rendered very clearly. The gradient test was smooth except for a faint hint of banding, but the black level test was spot on, clearly rendering each black square without any image noise at all. The test colours were also good – the red was slightly less vibrant than with the best DLP projectors, but the green and blue were glorious.

This carried over into our X3: Terran Conflict test, with the black level giving the space scenes a palpable sense of depth. Crysis was also impressive, and we actually felt that the bold Dynamic image preset mode suited the lush greenery of the island nicely.

A consequence of a good black level is usually good colours, and this proved to be the case.

Sony's remote was the best of the models tested.

In our Blu-ray version of The Matrix, a bomb was set off in a building to spectacular effect; the orange of the slow-motion explosions was simply sublime.

In the Cars DVD test, the colours were balanced and natural without being overly vivid, but it was the smoothness and lack of noise that set the Sony apart from the other projectors in this test, particularly the DLPs.

When Gandalf illuminates his staff in the mines of Moria, the glow comes out of the dark, instead of the grey of some lesser projectors.

The VPL-HW15 also did a great job of upscaling the 576p DVD to 1080p, with the Bravia Engine 2 earning its keep. The details on Boromir's lapel and shield were also evident.

The Sony is at the top end of this roundup, but in the world of projectors, it's relatively entry-level. If you can afford to have it permanently installed then the size of the unit won't be much of a concern.

The lack of a 12V trigger on the VPL-HW15 may push people towards the Panasonic PT-AE4000E, but if this isn't an issue for you and picture quality is your primary concern, Sony's SXRD-based projector is the clear winner – bar none. **BH**

Overall
The most expensive here, but hands-down the best projector money can buy.

92%

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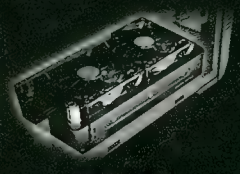

Top and bottom radiator

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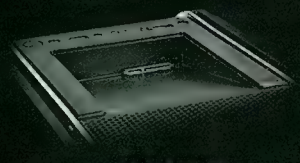

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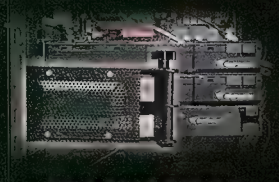

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Feature Table

	BenQ W1000	Epson EH-TW2900	Epson EH-TW3500	Mitsubishi HC3800	Optoma HD200X	Panasonic PT-AE4000E	Sanyo PLV-Z700	Sony VPL-HW15	Vivitek H1085FD
Specifications									
Lamp technology	DLP (6-segment)	LCD	LCD	DLP	DLP	LCD	LCD	SXRD	DLP
Native resolution	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080
Brightness (ANSI Lumens)	2,000	1,600	1,800	1,300	1,500	1,600	1,200	1,000	2,000
Claimed contrast ratio	3,000:1	18,000:1	36,000:1	4,000:1	350:1	100,000:1	10,000:1	60,000:1	5,000:1
Lamp life (typical)	3,000 hours	4,000 hours	Not stated	3,000 hours	2,000 hours	2,000 hours	2,000 hours	3,000 hours	3,000 hours
Fan noise (dbA - Normal mode)	29dbA	22dbA	22dbA	25dbA	29dbA	22dbA	21dbA	22dbA	27dbA
Inputs									
HDMI	2	2	2	1	2	3	2	2	2
Component	4	4	4	4	4	4	2	4	4
DVI	8	8	8	8	8	8	8	8	8
D-Sub	4	4	4	4	4	4	4	4	4
S-Video	4	4	4	4	8	4	4	4	4
Composite	4	4	4	4	4	4	4	4	4
RS-232 port	4	4	4	4	8	4	8	4	4
12V trigger	8	4	4	4	4	2	8	8	8
Features									
Speaker	4	8	8	8	8	8	8	8	8
Lens shift	8	4	4	8	8	4	4	4	8
Keystone correction	4	8	4	4	4	8	8	8	4
Kensington lock	4	4	4	8	4	4	4	8	4
Throw distance	Not stated	Not stated	0.87m-19.15	Not stated	1.5m-12.5m	1.02-18m	1.2m-18.4m	1.2m-14.1m	Not stated
Image size	24-300in	30-300in	30-300in	40-300in	38-313in	40-300in	40-300in	40-300in	60-300in
Zoom ratio	1.2:1	1-2.1	1-2.1	1.5:1	Not stated	2:1	2:1	1.6:1	Not stated
Throw ratio	1.59-1.9	2.4-5.1 (80in screen)	2.4-5.1 (80in screen)	1.52-2.26	1.5-1.8	Not stated	1.35 - 2.7:1	1.47-2.18	1.6-1.92:1
Weight	3.4kg	7.5kg	7.5kg	3.5kg	2.9kg	7.3kg	7.4kg	10kg	3.5kg
Dimensions (W x D x H) mm	325 x 254 x 95	295 x 228 x 77	450 x 390 x 145	345 x 129 x 270	324 x 234 x 97	460 x 300 x 130	400 x 346 x 154	407.4 x 463.9 x 179.2	335 x 256 x 102
Warranty	3 years	3 years (inc lamp)	3 years	3 years RTB	1 year RTB	3 years	3 years	3 years	3 years

KITLOG

These are our four basic systems, with something for every taste. On this page, the **Basic Game Box** is put together with money-saving in mind, but also an eye to getting as much bang for buck. It's the best value system for those who want a lot of processing grunt, but who don't want to sacrifice the upgradeability or compatibility that is so important. Intel's going to keep the P55 socket around for quite some time, so making the leap to this new platform is well-timed.

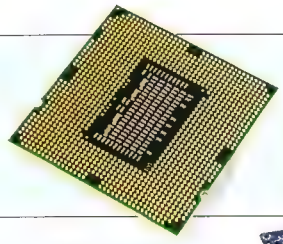
You may have read the review of Intel's Core i7 980X chip (Page 34), and are wondering why it isn't included in the Perfect PC. The truth is less exciting than the intrigue you might be hoping for: Gulftown is simply too insanely powerful and expensive to be widely recommended. Keep your eyes peeled for Kitlog online...

The Perfect PC, on the other hand, is the system everyone aspires to, with nothing but the best parts – without going crazy, though. It's a collection of all the greatest hardware that we'd pick without a budget, sure to impress with performance and sheer style.

Oh, and if you're wondering what the Ref IDs are, that's the ID of that article on our website. Just enter it like this – **www.atomicmpc.com.au/?NUMBER** – and you'll go straight to that review.

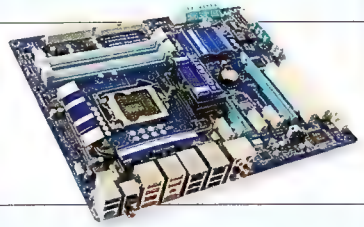
BASIC GAME BOX

CPU



Intel Core i5 750
PRICE $240
Intel's budget quad is more than you'll need in a chip!
Issue 106, Page 36

MOTHERBOARD

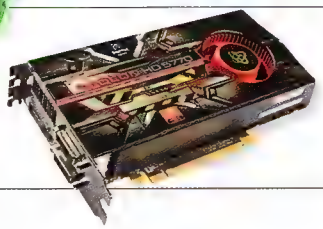


GIGABYTE P55-UD4
PRICE $225
A great value P55 board with some nice features..
Issue 106, Page 39

MEMORY

G.Skill Ripjaws 2000MHz
PRICE $190
Great value memory with amazing overclocking.
Issue 106, Page 52

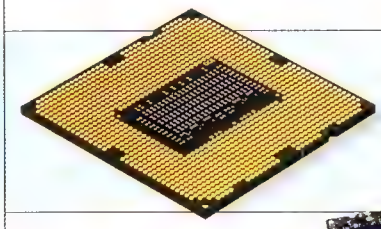
VIDEO CARD



XFX 5770
PRICE $200
A decent value way to get into DX11.
Issue 107, Page 47

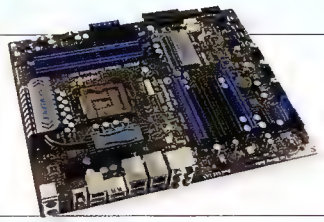
THE PERFECT PC

CPU



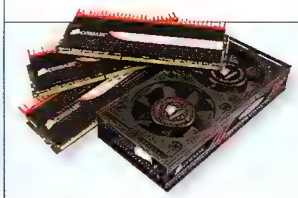
Intel Core i7 870
PRICE $690
The best enthusiast chip, evar.
Issue 105, Page 34

MOTHERBOARD



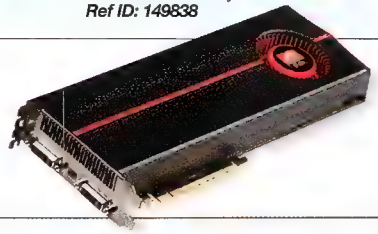
MSI P55-GD85
PRICE $320
P55, with all the SATA/USB 3.0 extras that we've come to love.
Issue 111, Page 38

MEMORY



Corsair Dominator TR3X6G1866C7GTF
PRICE $388
Plenty of memory, blisteringly fast and darn sexy.
Ref ID: 149838

VIDEO CARD



ATI 5970
PRICE $940
A dual-cored DX11 beast, the most powerful yet.
Issue 108, Page 34

For more builds check out the Kitlog E-mag at **atomicmpc.com.au/kitlog**

SUBTOTAL: $1699

COOLER

Coolermaster Hyper 212 Plus
PRICE $50

Nice cooling for a very affordable price.

CASE

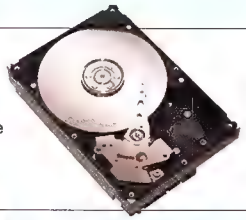
Lancool Dragonlord PC-K62
PRICE $165

Vibration dampened, great cooling and sexy looks.
Issue 105, Page 49

SYSTEM DRIVE

1TB HDD
PRICE $100

A thousand gigabyte storage drive on the cheap.



KEYBOARD

Razer Arctosa
PRICE $50

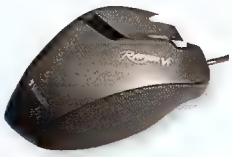
A cool-looking keyboard that'll serve you very well.
Ref ID: 149483

DISPLAY

Viewsonic VX2233WM
PRICE $199

21.5 inches of value-packed screen, great buy.
Issue 108, Page 42

MOUSE



Verbatim Rapier V1
PRICE $65

Great gaming performance and nifty features.
Issue 96, Page 43

AUDIO

Plantronics Gamecom 777
PRICE $85

Solid set of cans with great audio.
Issue 101, Page 41

Onboard Realtek ALC889A
A decent chip that does the job.

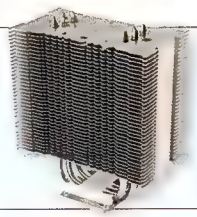
POWER SUPPLY

OCZ ModXStream Pro 600W
PRICE $130

Plenty of wattage, reliable, nodular for neatness.
Issue 109, Page 59

SUBTOTAL: $5381

COOLER



Noctua NH-U12P SE2
PRICE $95

Two fans, quiet and nice overclocking capacity.
Issue 107, Page 48

CASE

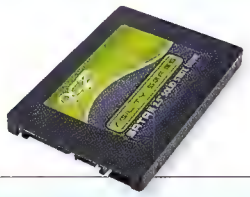
Coolermaster ATCS 840
PRICE $370

Heaps of fans, plenty of space, and dripping with quality.
Ref ID: 132479

SYSTEM DRIVE

OCZ Agility 120GB
PRICE $525

Lightning-fast Indilinx controller speed for your OS and games.
Ref ID: 158083

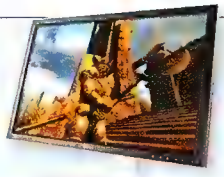


KEYBOARD

Microsoft Sidewinder X6
PRICE $95

Backlit, sturdy, magnetic numpad & macro keys; what's not to like?
Ref ID: 129535

DISPLAY



Dell 2408WFP
PRICE $899

A huge 24in LCD screen for your prettiest pixels.
Issue 103, Page 57

MOUSE

Microsoft Sidewinder X8 Wireless
PRICE $105

Cable-less, comfortable, lag-free and fraggable!
Ref ID: 148422

AUDIO

Logitech Z-5500D
PRICE $425

Earth-shakingly good.
Issue 48, Page 56

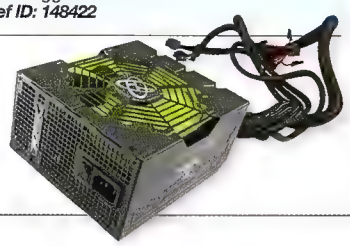
Auzentech X-Fi Prelude
PRICE $279

Best soundcard evar!
Ref ID: 112419

POWER SUPPLY

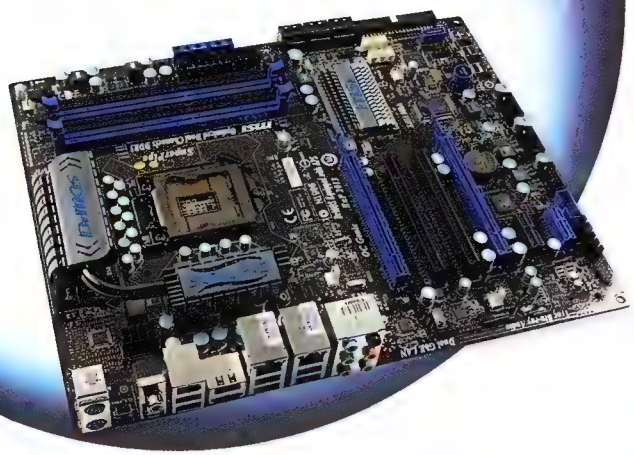
XFX 850W
PRICE $250

Plenty of power, ultra-stable rails and a great price.
Issue 107, Page 50



The **LAN Box**, the ultimate in portable gaming power – go anywhere, frag anyone. No longer will you be tied to a desk or forced to awkwardly manhandle your full-sized rig, helped by a convenient handle and beefy tech. Perfect for wowing people at LANs, the tech inside is fast enough to run any game, and boasts enough speed to keep your game running at full clip even if other programs intrude in the background. After all, no-one wants to miss a headshot.

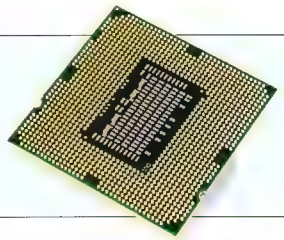
MSI's P55 motherboard is a great example of a board that, for all intents and purposes, is relatively future proof. While in effect this only lasts for a few years at best, the inclusion of SATA and USB 3.0 technologies will keep your storage needs happy for ages – and when you eventually upgrade, you can re-use the board in a spare system. Saving tech, money and speed when you need; now there's the Atomic ideal.



Finally, for the more entertainment-minded – and really, that's all of us – there's our **Home Theatre PC**, ready to play movies and music quietly and efficiently. It's got plenty of speed for video encoding while you're away, but makes very little noise thanks to the passive components used – even the heatsink can be dialed down to emit as much or as little noise as you want. Perfect for leaving next to the big-screen TV for all your media needs.

THE LAN BOX

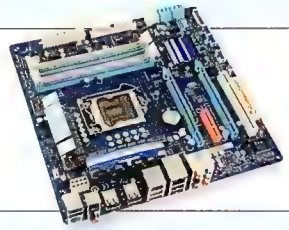
CPU



Intel Core i5 750
PRICE $240
Intel's budget quad is more than you'll need in a chip!
Issue 106, Page 36

MOTHERBOARD

GIGABYTE P55M-UD4
PRICE $195
Great overclockability, nice value.
Issue 107, Page 40

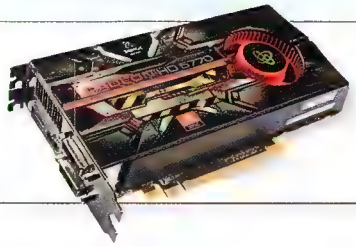


MEMORY

G.Skill Ripjaws 2000MHz
PRICE $190
Great value memory with amazing overclocking.
Issue 106, Page 52

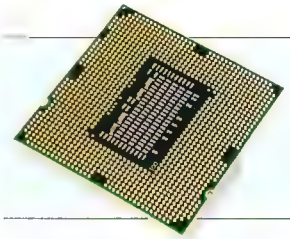
VIDEO CARD

XFX 5770
PRICE $200
A decent value way to get into DX11.
Issue 107, Page 47



THE HTPC

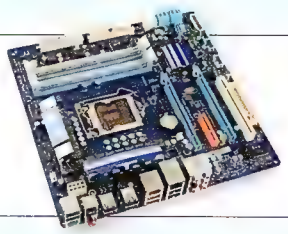
CPU



Intel Core i5 750
PRICE $240
Plenty of power for HTPC duties, video encoding champ.
Issue 106, Page 36

MOTHERBOARD

GIGABYTE P55M-UD4
PRICE $195
mATX form factor doesn't skimp on storage, or speed.
Issue 107, Page 40

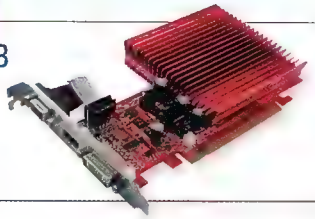


MEMORY

G.Skill Ripjaws 2000MHz
PRICE $170
4GB of fast memory is plenty for running multiple HTPC media streaming apps.
Issue 106, Page 52

VIDEO CARD

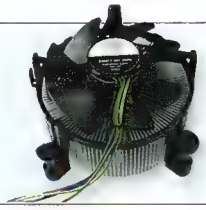
Gainward G210 512MB
PRICE $55
Perfect for Blu-Ray playback.



For more builds check out the Kitlog E-mag at **atomicmpc.com.au/kitlog**

SUBTOTAL: $1654

COOLER



Intel Stock Cooler
PRICE FREE

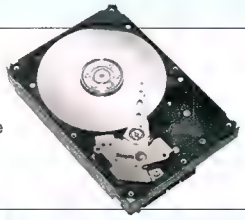
Does the job, fits under PSU well.

CASE

Silverstone SG04
PRICE $190

Small case with handle; add two 120mm fans for awesome cooling.
Ref ID: 148266

SYSTEMDRIVE



1TB HDD
PRICE $100

A thousand gigabyte storage drive on the cheap.

KEYBOARD

Razer Arctosa
PRICE $50

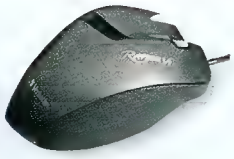
A cool-looking keyboard that'll serve you very well.
Ref ID: 149483

DISPLAY

Viewsonic VX2233WM
PRICE $199

21.5 inches of value-packed screen, great buy.
Issue 108, Page 42

MOUSE



Verbatim Rapier V1
PRICE $65

Great gaming performance and nifty features.
Issue 96, Page 43

AUDIO

Plantronics Gamecom 777
PRICE $85

Solid set of cans with great audio.
Issue 101, Page 41

Onboard Realtek ALC889A
A decent chip that does the job.

POWER SUPPLY

Corsair HX-520
PRICE $140

Modular, efficient and keeps size manageable in cramped case.

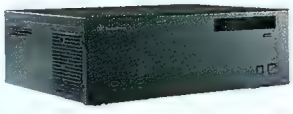
SUBTOTAL: $2337

COOLER

Scythe Big Shuriken
PRICE $79

Tiny 58mm height, quieter than a sponge.

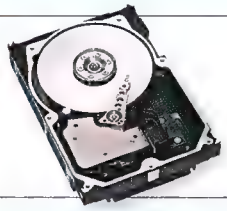
CASE



SilverStone Grandia GD04
PRICE $145

Stylish exterior, 3x120mm filtered fans, 2x3.5" HDD space with plenty of room.
Issue 108, Page 47

SYSTEMDRIVE



Seagate Barracuda 1.5T
PRICE $145

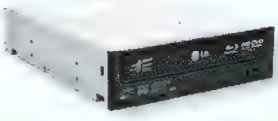
Fast, voluminous storage for all your pr0n, videos and music.
Ref ID: 141622

KEYBOARD

Logitech diNovo Edge
PRICE $199

Wireless board with a trackpad for mousing.

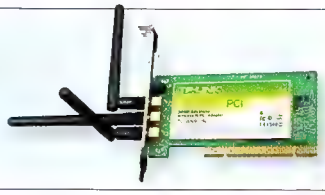
OPTICAL



LG GGC-H20L
PRICE $175

Bluray and HDDVD playback – best of both worlds

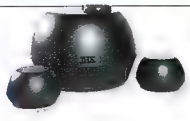
WIRELESS



TP-Link TL-WN951N
PRICE $55

Zippy 802.11N for wireless HD video streaming.

AUDIO



Razer Mako 2.1 Speakers
PRICE $469

Stylish tub-thumpers.
Ref ID: 126695

ASUS Xonar HDAV 1.3
PRICE $270

Nice sound, expansion good.
Ref ID: 135112

POWER SUPPLY

Corsair HX-520
PRICE $140

Modular and above all quiet for this whisper-soft build.

Thermaltake
COOLall YOUR LIFE

New Features, same Toughpower XT.

The New Toughpower XT series by Thermaltake offers users an advanced power supply solution, striking the perfect balance between reliability, efficiency and quality. With DC-to-DC voltage converter module, a 140mm cooling fan, S.P.T Indicator, FanDelayCool function and 80 PLUS® Bronze certification, the TPX-575M, TPX-675M, TPX-775M and TPX-875M are the ideal solutions for system builders and quality-minded enthusiasts alike.

- Single +12V rail
- S.P.T. indicator
- 14cm silent fan
- Life Time Warranty
- Modular power cables
- Support latest CPU and GPU
- High efficiency circuit design, 82 Plus ready

Tough Power XT

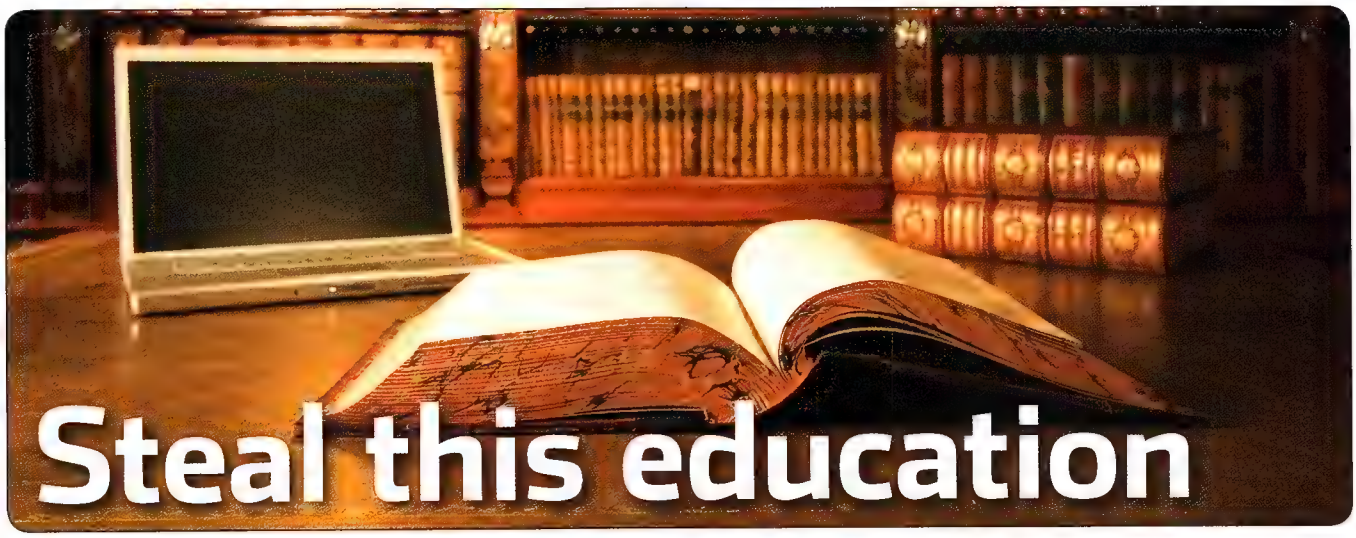
Xtreme Performance and Reliability

Lifetime Werranty

Eco-Friendly

80 PLUS BRONZE

www.thermaltake.com.au



Steal this education

Daniel Rutter has some crazy – and possibly dangerous – ideas...

I think copyright infringement may save millions of lives.

Allow me to explain.

I think we can all agree that most, if not all, of the problems of human society can best be solved by education.

Education tends to take a generation or so to work its magic, though, which is why politicians care so little about it. But if you want to improve the lot of the human race in general, better access to information isn't just the best way to go about it, it's the *only* way.

Until recently, improving information access in benighted parts of the world meant sending people who knew stuff there, to build schools and train teachers. This is not a speedy process.

their teenage years.

The Internet-connectivity problem remains, but dial-up-speed Internet actually is now accessible, reasonably affordably, in all sorts of improbable places. A single dial-up link may take a whole day to download an episode of *Desperate Housewives*, but it can snarf an advanced medical library, that can then be sneakernetted elsewhere, in about a week.

You can download a great deal of educational material for free, legally. There's Wikipedia, of course, but also many online Open University courses. MIT has an ongoing project to put *all* of its undergrad and graduate courses on the Web.

If you need recent textbooks, though, you'll find that textbook publishers are renowned for

barrier is the last serious one that remains.

Saying "information wants to be free, man" while you seed the h.264 rip of *Avatar* is not a very defensible position. But giving distant strangers a free education, against the wishes of a publishing company, is different. I think it's actually kind of like the push to get pharmaceutical megacorps to allow their drugs to be manufactured in poor countries and sold for what they actually cost to make.

I also do not think that there is anything wrong with some dude in Mali downloading a book that teaches him how to eliminate cholera in his village.

Just try not to think about how many copies of the entirety of Western philosophy could have been downloaded with the bandwidth that was instead devoted to *Meet The Spartans*.

When Dan Rutter gets it right, he really gets it right.
dan@atomicmpc.com.au

Hidden in among all those petabytes of reality shows and Madonna albums... is a surprising amount of educational material.

Modern technology offers some serious short-cuts. It's now quite easy, to choose just one example, to stick a useful percentage of the whole of Wikipedia on a laptop's hard drive. That's not actually the sum total of human knowledge, but it's a heck of a library, from the point of view of your average poor African village.

Throwing technology at the developing world used to be a bad idea.

The tech itself was far too expensive, for a start. It needed too much electricity. And there was no

connect it to the rich world's Internet.

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charging every last penny the market will bear, as frequently as possible.

Fifty bucks for one text is painful enough for Australian uni students. If you're living in some part of the world where $50 is your entire household budget for the next two months, it's... worse.

Unless, of course, some uni student takes a weekend to scan the book and then make a torrent of the PDF. As, inevitably, many uni students have.

Hidden in among all those petabytes of reality shows and Madonna albums and pr0n on your local wretched hive of BitTorrent scum and villainy is a surprising amount of educational material.

Permaculture. Animal husbandry. Medicine. Whole libraries of "Appropriate Technology" publications, about efficient stoves and evaporative food coolers and comfortable mud-brick houses. It's mostly in English, of course, but I'm starting to suspect that the language

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TUTORIAL

HANDS-ON TUTORIALS FOR THE TECHNICALLY MINDED

If you've been clenching your tute-bladder, waiting to release it all over the floor in an excited rush when you flip to the tutorial section, then we've finally (and perhaps quizically) got something for you!

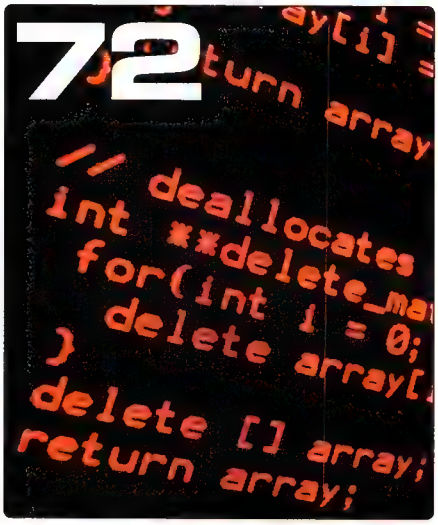
This month we open the tute section of the mag with a guide on shooting your faithful rig. Just spent a couple thousand dollars on putting your newfound computerised companion together? Learn how things look sexier when riddled with bulletholes!

And, unlike a fine wine aged in pure mahogany barrels, your computer will only look (and taste) worse with age, so there's no better time than five minutes ago to start snapping.

Chris Taylor also returns this month with advice for those looking to get into programming – he talks to real employers about what they expect from potential recruits.

It's gonna be awesome. Go read!

TUTORIAL CONTENTS



Coding jobs

Chris Taylor discovers what to expect in the coding industry.

For *Atomic* Issue 110, we spoke to representatives from Firemint and Blue Tongue - two of Australia's most well known games development studios - about what it takes to not just get that first games development role, but also succeed in it. We felt we were successful. The companies offered perspectives that were slightly different, but equally valuable to those readers nearing the end of their studies and the beginning of their games development career.

Indeed, we liked the results from last month so much we decided to do the same thing over again. Only this time, instead of looking at the games development industry, we asked about (non-games) programming gigs. We spoke to representatives from two software development houses: Rob Gray from SDSI (**www.sdsi.com.au**) and Andrew Le Lievre from Microsoft. They are, respectively, a software development manager and a recruitment manager. We wanted to find out, straight from the horse's mouth, exactly what it takes to become a successful coder.

What qualities do employers look for?

Getting a degree isn't hard: show up to class, pay attention when the lecturer is saying something important, read the set textbook, finish the assignments. If you want to set yourself apart from the pack, you need something more.

"When we look to fill a graduate position," says Gray, "we go in with low expectations. During the interview process, graduates are asked only basic software engineering questions such as, 'Can you explain the fundamentals of object-orientation?' Most graduates understandably don't have a lot of real world experience, [so] instead we focus on interpersonal skills and enthusiasm. [We ask] questions like, 'What made you decide to study software development?' An important factor in hiring anyone - and graduates are no different – is whether or not they have a personality that will benefit the team they'll be going into."

Le Lievre looks for "a real passion for technology, intellectual horsepower and a good fit for the culture of the business." On the matter of qualifications he says, "Unlike countries such as the US, many students in Australia often don't cement their career paths until graduation is impending. As a result, we focus on identifying raw potential as opposed to focusing on those with evidence of honed skills and abilities. Screening by school or by grades alone can be misleading, as there are many talented students who select their school on criteria other than rankings or who do not pursue high grades. It is for this reason that we have a very inclusive recruitment model."

Many IT courses offer, as part of the second or third year curriculum, an internship. We have said in the past that this is a good opportunity for seeking employment. Le Lievre backs this up, saying it "is the preferred method of recruitment for many corporations, including Microsoft." He adds, "We have a comprehensive and exciting program in place in order to attract talent very early in the academic cycle. Microsoft passionately believes in creating a flexible work culture for its interns. For instance, some interns work part-time while studying. Others prefer to work throughout the summer break or even take a semester off. We look at each candidate and tailor an internship according to their needs."

Are there any misconceptions graduates frequently have?

"It's common to interview graduates that think they're prepared to slot into what we would consider a mid-level role," says Gray. "That is, they're keen to start developing new functionality on day [one]. The reality is while university teaches students the theory, every code-base is different and an understanding of the architecture as well as the problem domain is needed before a developer can be unleashed. Graduate developers start life as testers, where they're at best writing test cases and otherwise just performing a Quality Assurance function on code the other team members produce. It's generally seen as a negative role and graduate developers can visibly deflate when they're told they'll be testing instead of writing the next killer app."

Le Lievre gives some different, although not incompatible, advice. "In the search for work, graduates often try to be all things to all companies and believe that being flexible will provide the broadest variety of opportunities. We find the best candidates know their strengths and focus exclusively on opportunities that leverage them. If an organisation does not have a role that fits, they look elsewhere. Those who focus on company brand, often taking a role not suiting their natural strengths, can find themselves performing poorly: not good in a first role. Graduates' chances of success are greatly improved if they focus on roles they are genuinely interested in."

What mistakes do graduates make?

"The most common negative I see when interviewing [graduates] is one of personal skills. It's [common] to interview developers that make the ability to integrate into a team," says Gray.

"Integrity and honesty are absolutely critical," says Le Lievre. "Many students don't understand what that means in a corporate context and consequently provide responses in an interview that they think will get them a job, rather than being true to themselves. Employers then inevitably question interviewees' integrity in the workplace.

The critical difference between school and a professional environment is that guesswork is acceptable in school and has little or no consequences. In the workplace, guesswork is a potential liability, especially in client situations and can quickly lead to credibility issues. The old mantra of 'I don't know, but I will find out' is applicable here."

How does the typical career progress?

"The assumption in the question is that entry-level jobs do not offer challenging and exciting opportunities," says Le Lievre. "The Microsoft Academy for College Hires (MACH) program for new graduates is an incredibly engaging and rewarding opportunity. Graduates benefit from an accelerated career development program across a broad range of roles. It aims to cultivate their talent, utilising training, mentoring and community support. MACHs get exposure across several areas of the business, as well as participating in a global summit in Seattle and gathering together in APAC to review and work through business problems together. They also job shadow and have exposure to senior executives across the company. It is highly competitive and an extremely challenging program that offers graduates a rich and rewarding career path.

"There is no typical career path for Microsoft graduates. While there are certain parameters around each role, no one is limited by them. Microsoft has a global mobility strategy around a two-years-minimum-in-role policy with employees encouraged to apply for other opportunities in different countries or cities or business units if they wish. Microsoft works hard to foster an environment where intelligent, motivated and passionate people can thrive and it is for this reason that we are regarded as an employer of choice."

Gray's advice isn't specific to any one company and provides what we feel is a reasonable assessment of career and income prospects for those interested in climbing the corporate ladder in search of greater responsibilities and more money. "Graduates (~$45,000 PA) usually spend the first year of their professional life fulfilling the QA role," he says. "The more talented [graduates] will also be maintenance programmers. Typically, if there's work that needs to be done on internal software, such as issue tracking or the intranet, graduate programmers get those [jobs]. In the first year, they're not ready to be let loose on production code unsupervised. On occasions, if there's been a simple change the graduate developer can perform that, providing a mid or senior developer checks it over.

"Usually after the first year, the graduate is ready to take tickets off the issue-tracking software and start working unattended. That is they've [become a] junior developer or maintenance programmer ($55,000-$60,000). [After] two years they're ready to start designing their own pieces of the application and are given requirements and specifications to start coming up with solutions. They also start attending customer and site meetings with senior developers and start gathering requirements for new work. They may also be starting to fill mid-level ($70000-$80,000) roles, if they're talented enough.

"Around five to seven years after graduation, a decent developer should be able to fill a team leader or senior developer role ($110,000), which is the first step up the management path. Team leaders spend more time designing and architecting software and less time writing code. They'll start giving out work to junior programmers and start mentoring new staff. I'd expect eight to ten years after graduation they'll be at the architect level ($120,000 plus), where they're gathering requirements from customers and architecting full solutions, before passing [it] on to team leads to focus on specific areas. Toward the ten year mark, after spending time as an architect, they'll be experienced enough to move into a development management role ($120,000-$175,000, [plus] bonuses and perks), managing the entire engineering and development effort at their company, if they choose to go down that path."

After all that, Gray adds, "The path a developer can follow varies from company to company. At smaller companies or in smaller teams, the roles often blur together."

HOW TO TAKE BETTER PHOTOGRAPHS OF YOUR PC

This simple guide will help to banish those dark, noisy, out-of-focus shots and make your photos the envy of the Internet.

So you've just blown this month's pay packet on your dream case and a load of shiny hardware. You might even have performed a few mods on your case or installed water cooling. In any event, you probably want to show off your pride and joy to your buddies on your favourite forum.

Most of us have a digital camera these days, and many of them are easy to use and the results can be posted online in a matter of minutes. However, taking photos in low light or close up can often lead to poor results. Even expensive Digital SLR (DSLR) cameras have an auto mode but it won't always give you the result you're looking for. In some cases, the end product can be quite disappointing. If you haven't ventured away from the auto mode on your camera, it's well worth delving a little deeper.

A few seconds of work here, if you know what you're doing, can make all the difference. Tripods can also allow for brighter, sharper images and some can be had for just $60. This guide suggests some basic tips and tricks, enabling you to take better photos of your PC.

Learn to use your camera

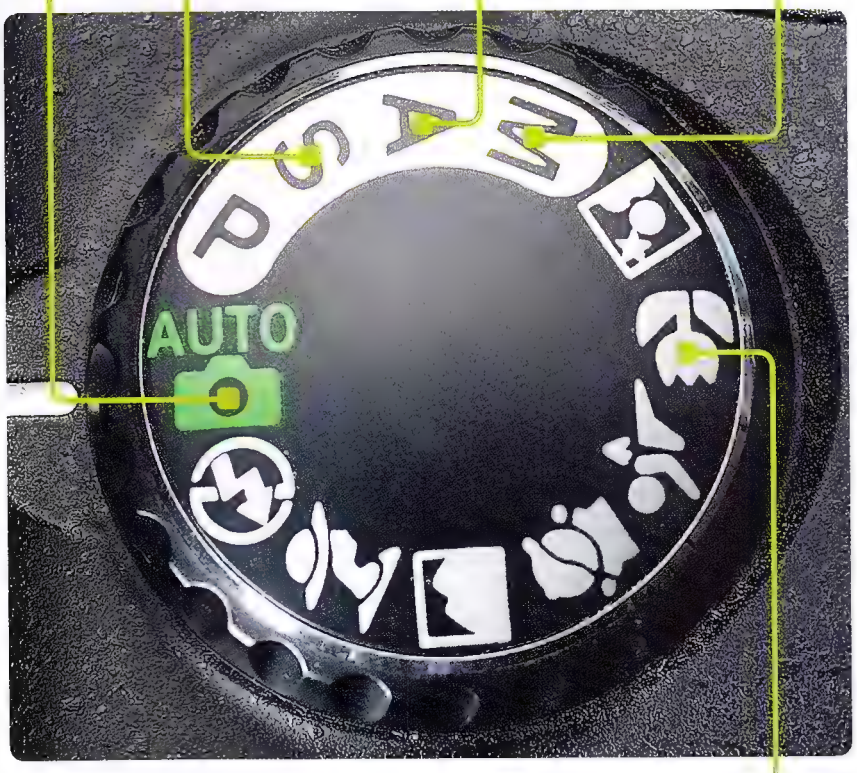
Auto mode is fine for well-lit shots of landscapes and family portraits, but it isn't advisable to rely on it too much. In fact, it's usually configured just for handheld photography in good light, so it often falls short when used in other situations.

Exposure and ISO

Exposure is the length of time the shutter is open while taking a photograph, allowing light to reach the image sensor, or film on traditional cameras. For handheld photography, 1/50th of a second or less (less being 1/60th, 1/70th and so on) for still images will ensure blur-free photos, depending on how steady your hands are. An 'S' symbol on most digital cameras specifies exposure or shutter priority mode, where you set the exposure time, and the camera deals with ISO and aperture. Exposure priority can give you control over the exposure

Know your camera's controls

Many modern cameras, from compact point and shoots to Digital SLRs, have presets that allow for much greater control over your camera and can result in far better photos. These presets usually let you control one setting while the camera takes care of others, which can make the learning curve much less steep. Full manual control places all of these settings in your hands, which can be quite daunting at first. We're going to explain what they are and more importantly, how they affect your photos.



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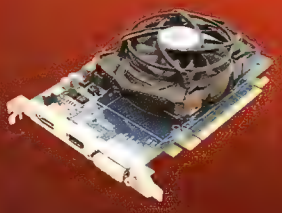

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Correct exposure will result in a well-lit subject. Too little will see many areas fade to black and loss of detail, while too much will result in whiteouts as well as the photo being blurry if you aren't using a tripod.

time to ensure that it's set to what you need, while the camera manages other settings. Again, in good conditions, this usually works well and will also allow some experimentation, but in low light, there are better methods that we'll come to later on.

In low light, a factor called ISO comes in to play. This refers to the sensitivity of the film used in traditional cameras, but it still has a purpose in digital cameras and is often called ISO-equivalent. A high ISO speed will increase your camera's sensitivity to light, meaning that you can get away with a shorter exposure time.

Aperture

The aperture of a camera allows light to reach the image sensor and it varies in size, letting more or less light through while taking a photograph. The aperture size is specified by changing what's called the F-number in the camera's menu. A low F-number allows more light to reach the image sensor than a high F-number.

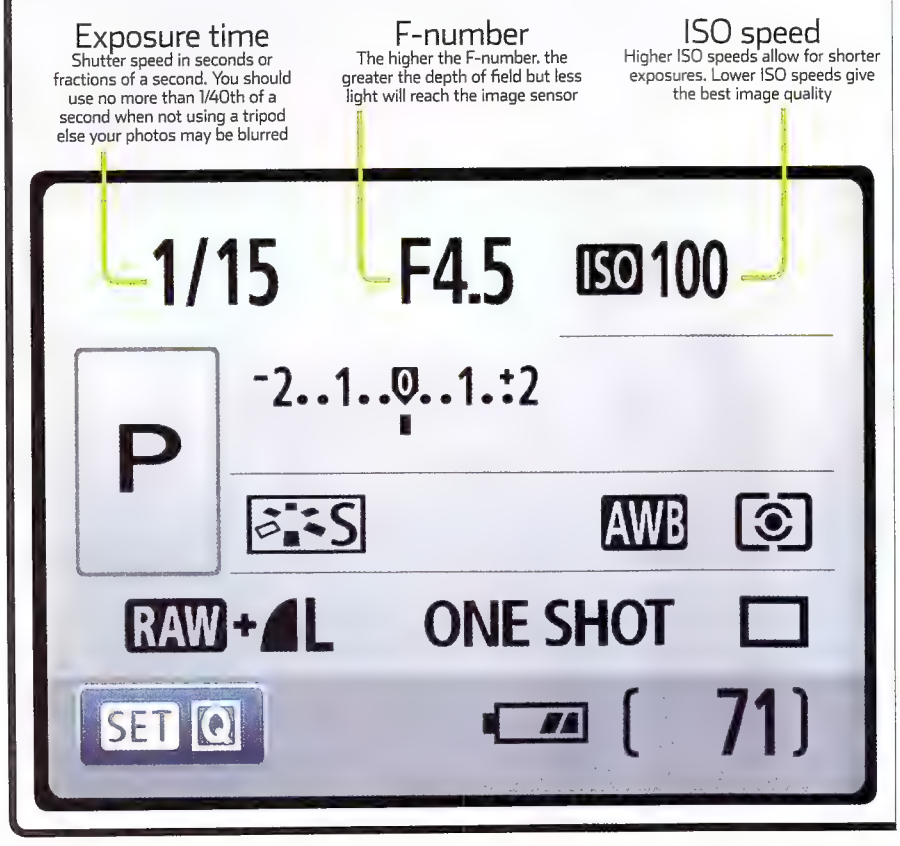
The effect aperture has on photos is mainly to do with the depth of field, or in other words, how much of the photo is in focus. While taking a photo of a person standing 100m in front of a building, for example, an F-number of 2.8 will only allow for the person or the building to be in focus, but not both.

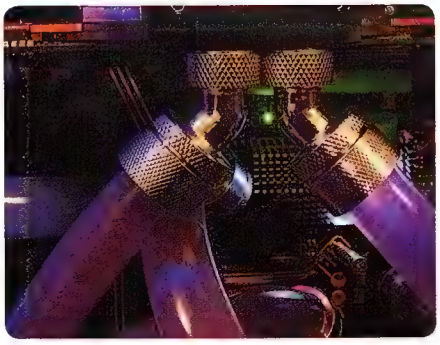
The advantage of using a low F-number is that a lot of light reaches the image sensor, so your camera can use a faster exposure and has more chance of being blur-free, which is useful in low light. However, you might want more of the image to be in focus; for example, with your PC, you might want to photograph the front of the case, with the side and internals also being sharp and in focus.

In this case, you'll need to opt for a higher F-number. All cameras are different, so there's no hard and fast rule. In general, though, F8 and above allow for good depth of field and should be used for photographing entire objects. Higher F-numbers reduce the amount of light reaching the image sensor, therefore

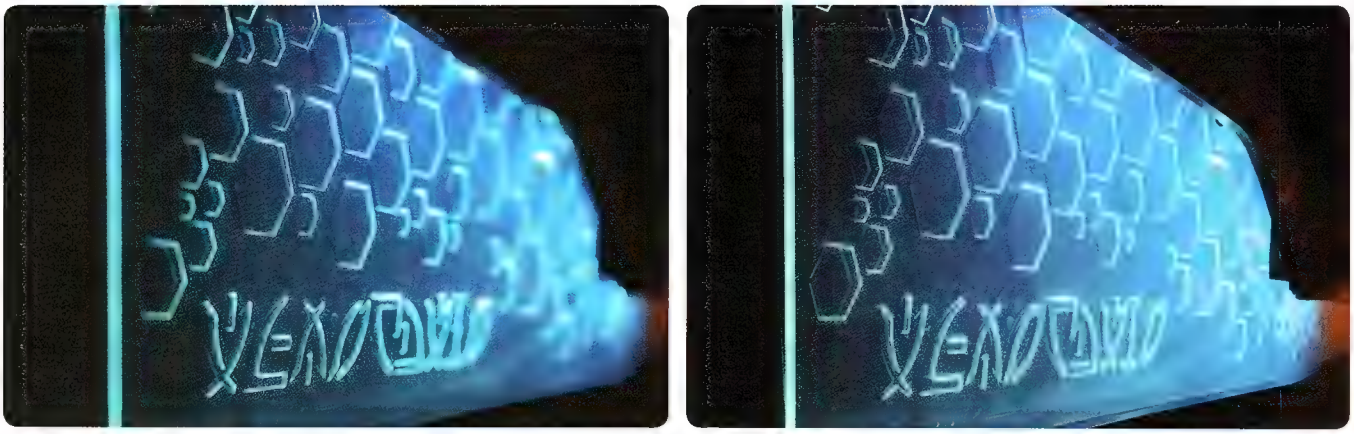
Know your camera's settings

LCD displays on the rear of digital cameras usually show many of the current settings. However, with soe cameras, you may need to delve into the menus to find some of them. If in doubt, look in the instruction manual.





Excessive sensitivity introduces electronic noise to the photograph. Point and shoot cameras suffer from this quite badly, usually at ISO 400 and above. Digital SLRs work much better, thanks to larger imaging sensors, but can still suffer from this problem. The lowest ISO speed will provide the best image quality.

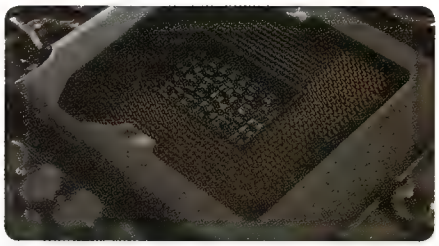


A large aperture/ low F-number will have a small depth of field, as can be seen in the top image, where we used an aperture of F5 and a shutter speed of 1/40th of a second. In the bottom image, we used an aperture of F22 but had to increase the exposure time to ten seconds. A small aperture/ high F-number will result in greater depth of field.

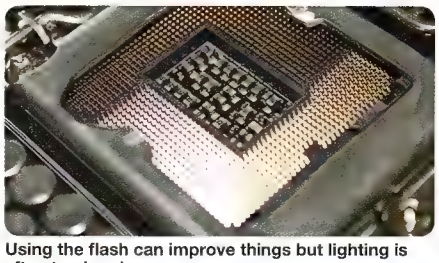
requiring a longer exposure, higher ISO speed and possibly a tripod to ensure blur-free results. An 'A' symbol on most digital cameras specifies aperture priority mode, where you set the F-number, and the camera deals with ISO and exposure.

Focus

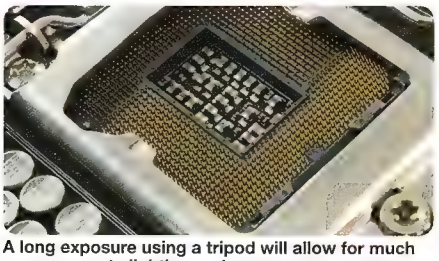
This is where most people struggle in photos, especially when photographing their PCs. Auto focus is all very well, but it doesn't work well in low light and you can easily focus on the wrong area, leaving the area that you wanted to photograph blurred.



A high ISO speed, low F-number and an exposure of 1/40th second can still result in poor exposures in low light.



Using the flash can improve things but lighting is often too harsh.



A long exposure using a tripod will allow for much more accurate lighting and more even exposure.

Many point and shoot cameras have a manual focus, which you should use. This may just be a close-up of the object at which the camera is pointing, with a slider bar to adjust the focus until the image is sharp, but it can work wonders. It will make the difference between something that should be in the recycle bin and something that people will want to use as their desktop wallpaper.

Digital SLRs are much easier to work with here, as their lenses can be manually focused, allowing for sensitive adjustment. Even so, if you end up with blurred image, try again. Your project log will look much better as a result.

Macro

If you're shooting less than metres away from the subject, setting your camera in macro mode can often improve results. The macro button usually has a small flower symbol on it and can also be located on your camera's mode dial. If you're less than 60cm away, you should always use it, as your camera will simply be unable to focus on the subject otherwise.

Close-ups are where the F-number really comes into play. However, as macro mode is usually fully automatic, you'll need to switch to manual mode to make fine adjustments. Unless you're focusing on a specific part of a specific component, macro mode can be of limited use, as the depth of field is often tiny. For example, with a low F-number, the most you're likely to get in focus is a single row of capacitors or a PCI-E slot on a motherboard.

You'll need to use your camera's highest F-number setting to achieve any significant depth of field; this means that your subject should be well lit to avoid high ISO speeds if you aren't using a tripod.

Manual mode

While exposure priority and aperture priority can give you control over individual settings, the camera won't always do what you need it to do with the others. For example, in low light using exposure priority mode, the chances are it will use a low F-number and very high ISO, which will probably result in noisy photos with very little depth of field.

If your camera has a manual mode, it's a good idea to learn to use it if you don't need the speed of auto mode. Manual mode is usually selected using the 'M' symbol on your cameras mode dial. We've already seen what exposure, aperture and ISO speed do, and manual mode is all about finding a balance between them. In general, it's best to avoid high ISO speeds, and without a tripod, a fast exposure will allow for sharp images. A high F-number will allow for good depth of field, but getting all three just the way you want them isn't always possible without additional equipment such as lighting and a tripod.

Some additional features available in manual mode often include white balance, image quality and shooting format. White balance is part of the camera's effort to adjust to whatever lighting you're using. AWB or automatic white balance can often do a good job, but it's worth trying a few different settings,

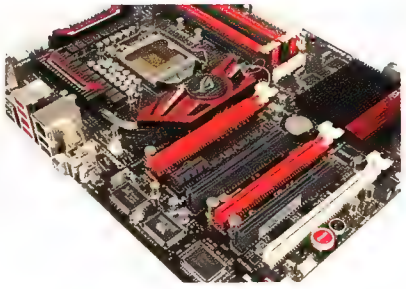
A tripod can be an invaluable aid for producing sharp images, as it allows for longer exposure times.

El Cheapo lighting

If you're thinking of buying your own lighting but can't afford the expensive hardware specifically designed for photography, basic garden or work lamps from stores such as B&Q can achieve good results and are a fraction of the price.

You'll sometimes be stuck inside with no good lighting sources. However, if you have a tripod and a camera that can dish out some long exposures, all might not be lost. With all other lights switched off and a light source such as a desk lamp, it's possible to light an object by moving the lamp gradually across it during a long exposure.

As long as this is done fairly evenly, which might require some practice, you can achieve exposures similar to those with photographic lighting. In addition, using a long exposure preceded by a flash will help to illuminate the PC and background, but also allow the lighting to be sufficiently exposed. When photographing an entire PC, it's important to consider each surface independently to make sure they're all well lit.



This was the result of a 6-second exposure in a pitch-black room with a single desk lamp light source being moved across it. The result looks as though the image was taken in a well-lit room.

especially if you're shooting indoors with artificial lights. Image quality (not to be confused with image resolution) is usually adjustable between settings such as fine and superfine. You should always try to use the highest setting. It will use more space on your memory card but your photos will be much sharper.

Shooting format refers to the type of image format in which your camera will save photos. Most cameras just use JPEG, although an increasing number can use RAW too. RAW format, unlike JPEG, has had little processing or compression applied to it by the camera. As such, it can be easier to work with in image editing programs, where white balance and colour can be altered much more effectively. The downside is that RAW files take up more space.

Use a tripod

Photography is usually about compromise. Dark scenes usually require high ISO speeds if you're shooting handheld, as does increasing the depth of field with the aperture letting in less light. However, a tripod can turn the tables in your favour. The problem with handheld photography is that you're limited to around 1/40th of a second of exposure time. Any more than this and your photos will probably become blurry. This limits your options when it comes to shooting in poor light, or if you simply need a long exposure to emphasise lighting in a PC.

A tripod allows for unlimited exposure times, as the camera isn't wobbling around in your hands. This means that you can use your lowest ISO speed and highest F-number, and still let in enough light.

In addition, even with fast exposures, the effect of shaky hands can work its way in, but photos taken with a tripod are always sharp, as long as you've focused correctly.

Neat toys

Lamps can focus too much light on a small area. A diffuser or light tent can help to spread the light more evenly over the subject and will also work well outside using sunlight. They're relatively cheap too.

Lighting

Light plays a pivotal role in any photograph. However, you don't always need as much of it as you can get. It's usually best to light your subject with ambient light or daylight rather than using your camera's flash. Colours and lighting will be much more pleasing. It's important to use similar or identical lights, and also to not mix ambient light with daylight, as all lights are slightly different colours. Also, photographing a PC with lots of cathodes, or UV-reactive plastic or tubing in bright light or daylight can result in these parts losing their glowing effect.

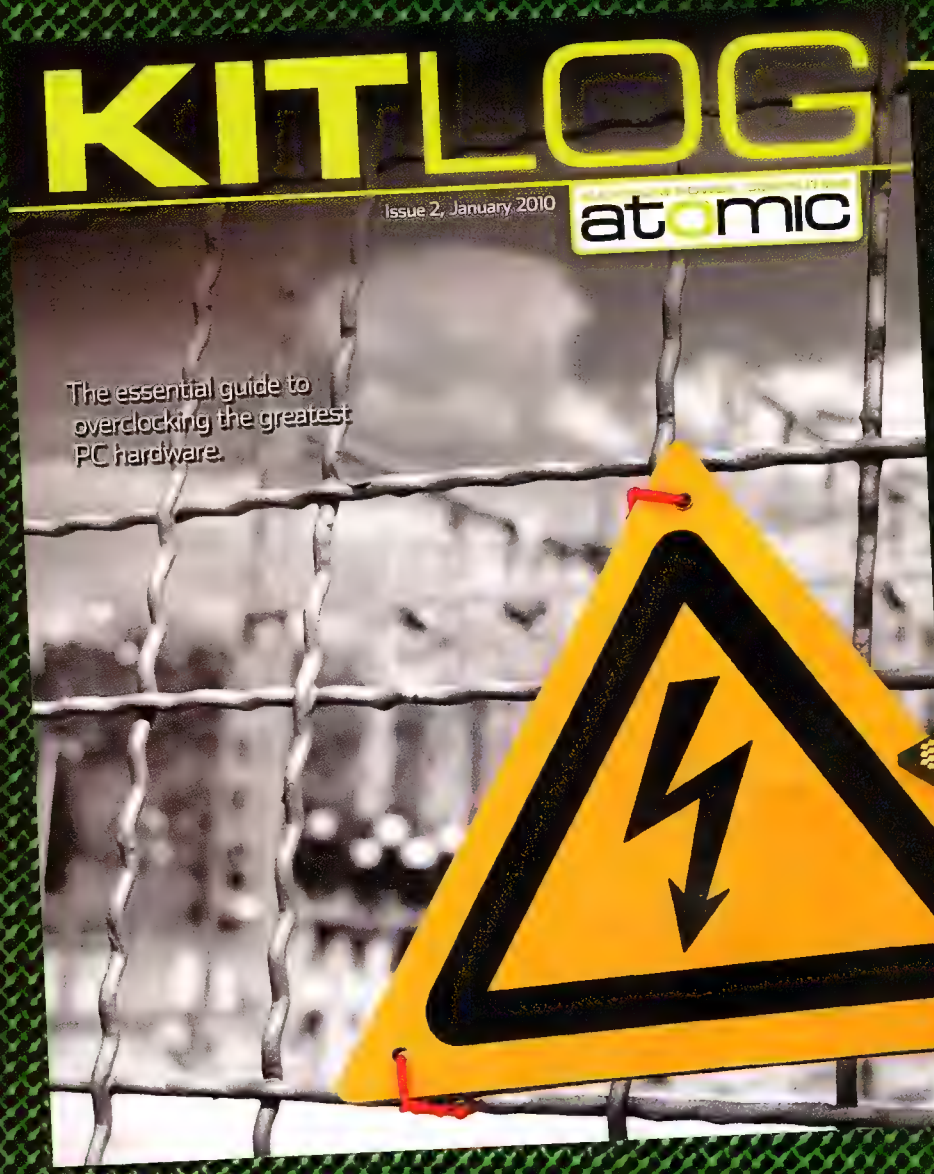
Using low ISO speeds, high F-numbers and long exposures are a good way of emphasising the lighting in your PC. The best way to achieve this is in a darkened room with little or no other light sources. For this, you'll definitely need a tripod or some way of holding the camera completely still.

Photographing a PC in a well lit room which has some form of UV lighting or cathodes will see the glow from this lighting dissapear.

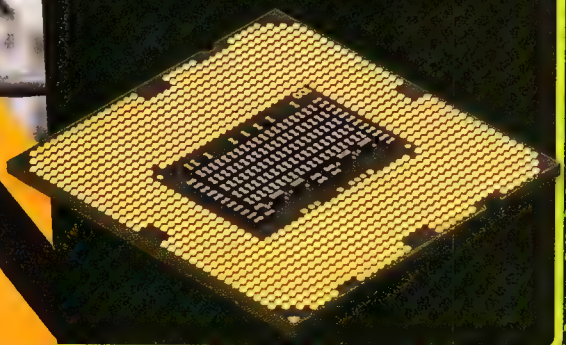
Turning off the lights and using a long exposure of several seconds can emphasise the lighting, which is great for PCs with lots of cathodes or water cooling.

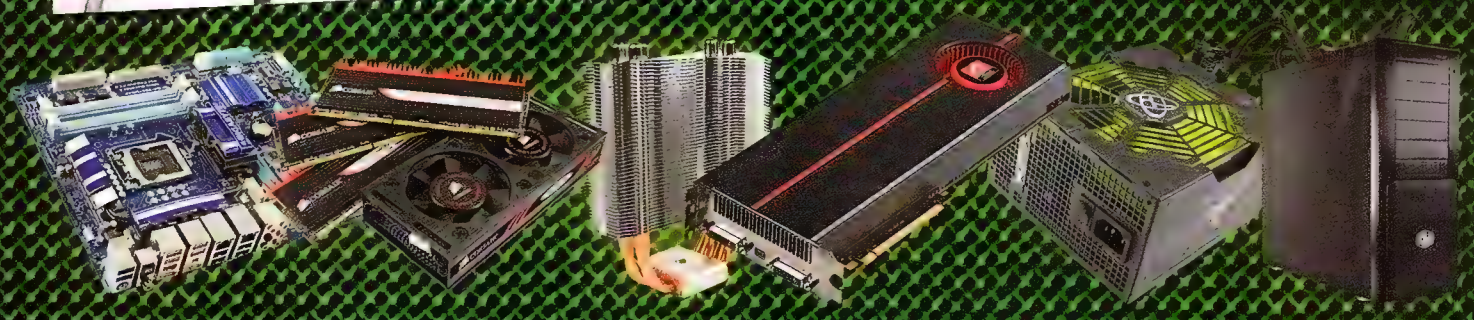
Using flash or turning the lights on for a second or so at the beginning of a long exposure can allow for outlines and details of the PC to appear.

Do you like building systems?



Are you keen to always know the best hardware for any PC build or rig? Then you need to check out our new Kitlog eBook, a quarterly online publication dedicated to showing you the best gear for more than a half-dozen projects.





Only available at www.atomicmpc.com.au/kitlog

GAMEPLAY

GAMES, GAMING AND FILM COVERED... ATOMIC-STYLE

Finally, a fantasy that doesn't involve gigantic swords and hair. Wait, no, it does, but perhaps that's why we're so excited – we've spent some serious quality time with XIII in a special four-page look at this installment to the epic FF series, and it's only a few pages away!

We've also got a special look at the measures that Ubisoft are taking towards Digital Rights Management; those three words that strike fear into the hearts of gamers and pirates everywhere – get the knowledge you need!

In all there are a total of seven whopping games this issue, with some heavy-hitting titles and some fantastic gameplay in store. If Christmas was traditionally the time for great gaming – then it seems Santa has returned.

GAMEPLAY CONTENTS

Copy protection:
The life and death of PC gaming

Could the latest in DRM bring an end to the PC gaming era? And whose fault would it be?

In the 'PC versus console' clash of cultures, one factor for AAA developers is getting harder to stomach. PC gamers are the most serious game pirates around. Consoles simply throw more hurdles in the path of those who would choose to copy. So the sales-to-piracy ratio is much better than on the PC, where direct disc access tools are freely available. With the announcement that upcoming titles from Ubisoft will feature the most draconian DRM system to date, PC gamers face some tough choices in whether they stay true to their beloved box or decide it's time to give in and head for the couch.

Hard facts

It's easy to find PC gamers who casually dismiss the impact of piracy. But if you love your gaming hobby and have any understanding of the right of a creator to be rewarded for their efforts, the statistics are starting to look very grim.

According to torrent news site TorrentFreak, the most pirated games of 2009 were copied at four times the rate of 2008. In just two months post release, Modern Warfare 2 was copied 4,100,000 times. Even allowing for some error in their calculations, and doing some back-of-the-napkin maths on actual sales volumes attached to MW2's $500m juggernaut, this could mean almost as many copies of Modern Warfare 2 have been pirated on PC as have been sold on all platforms. That doesn't directly point to 'lost sales' like some copyright owners would like to suggest, but no one can deny that would represent a very real impact.

Comparing with 2008, Spore was the most torrented game of the year. Notoriously remembered for its strict DRM, with a maximum of three installs possible at launch, it was a game that many excused themselves to feel okay about downloading. Even under those circumstances, the game — at the time the most pirated game on record — was ultimately grabbed 1,700,000 times according to TorrentFreak's statistics.

Yet in 2009, the five most torrented titles were all in excess of that number. The Sims 3 (3.2m), Prototype (2.35m), Need For Speed Shift (2.1m), and Street Fighter IV (1.85m) blew away all previous numbers, and were comfortably doubling the rates of torrent piracy for any console platform.

In 2008, only two other games topped 1,000,000 copies. The Sims 2 and Assassins Creed.

Ubisoft gets serious

French publisher Ubisoft has tested a number of ideas in digital copy protection in recent years. It's important to note that with its Prince of Persia release for PC the company chose to distribute with absolutely no copy protection whatsoever.

Now it has been announced that with Assassins Creed 2 and Settlers 7, and likely more Ubisoft games to follow, a new system will require a constantly active Internet connection to play the game. Should your active connection to the master servers drop for any reason, the game will pause and wait for reconnection before you may resume. Even more unfortunately with Assassins Creed 2, the game will push you back to the last save point, so you will lose some progress.

> For those who pirate, there are explicit elements of games that will be unavailable...

What has received less attention is that it supports unlimited installs and stores your save games in the cloud. Two things many gamers have been looking for, but probably not with such an onerous cost to play.

We asked Ubisoft if their latest move was in

response to heavy piracy on Prince of Persia, but company reps responded that this new system has been in development "for some time" and there was no direct relation to how that game fared.

The carrot or the stick?

When Valve launched Half-Life 2 with the demand of online activation through its new Steam service, there was outrage. At the time, the idea of online activation was seen as a major imposition. Years later this is one of the more comfortable concepts in DRM, and many gamers see benefits to having their games associated with the Steam service.

Today there are other 'carrot' DRM options too. EA has attached free downloads to the first-buyer's activation of games, including Dragon Age: Origins and Mass Effect 2. This is in part to stem the flow of 2nd hand purchases, but it's a clear bonus for gamers who choose to buy new. For those who pirate, there are explicit elements of games that will be unavailable to them. Particularly where verified online multiplayer is locked out.

Some gamers have shown disappointment at holding back on content in these ways, but any copy protection method that attempts to encourage and grant benefit to retail purchasers will have a more positive long term effect than those that hamstring legitimate buyers.

Nothing left to lose

On one hand, many in the gaming community suggest this system, like that of Spore's, will be a short-lived experiment. That buyers will push back against the idea, and many more will pirate the game as 'a message' of discontent.

One thing is certain. It hurts Ubisoft and it hurts paying customers more than it hurts pirates. It is undeniable that the game experience on a pirated version of these games will be smoother and less prone to misfortune than that of a retail version.

But, if piracy has already reached a threshold where more illegitimate PC copies of a game are doing the rounds than will ever be sold, a hard line approach may be all that is left before the platform is abandoned by major publishers. **SB**

COPY PROTECTION
A BRIEF HISTORY

Type it yourself: Before magnetic media was prevalent, DOS gamers had to type in the BASIC scripts for games from game magazines. Copy protection? If you can be bothered typing the code, you could have the game. Hard times.

Magnetic flaws: Once floppies arrived, games were getting swapped with ease. Some distributors used intentional disk flaws like holes in the media to force a unique read signature, while others wrote back to the disk after first install to prevent further use. Soon software duplication software overcame these flaws. Simple times.

Decoder rings: Fancy code wheels were soon packed in with games (often in colours that prevented photocopying) or with manual checks that forced you to flick through the included manual (extensive back in the day) to type a word from a certain page, paragraph, and line. Novelty items that were packed in the box were part fun, part copy protection. Fun times.

More flaws: CDs arrived next and were safe for quite some time, but once CD-R became common it was game on. Hidden files, extended disc sectors or bad sectors were all introduced. But bit for bit disc copying was quick on their heels. Again, simple times.

SecuROM: Software solutions started to emerge, with the notorious SecuROM leading the charge with other similar companies like SafeDisc. These caused some false positive issues, where legitimate copies were unusable due to the user's hardware and system configuration. Bad times.

Steam: Install where you like but activate it on your online Steam account. What once seemed annoying now seems quite reasonable. Balanced times?

StarForce: A low point in DRM, StarForce basically installed low-level malware as a form of copy protection. Even on uninstallation of a game, StarForce would be very difficult to remove, and could still cause system slow downs. Very bad times.

Stardock: Not to be confused with the above, but Stardock is one of a number of smaller developers embracing zero copy protection. Buy a license online or at retail and insert your serial number to unlock and play. Happy times.

MODIFICATION

with Ashton 'For the love of Mod' Mills

Mechwarrior: Living Legends

Game Crysis
URL www.mechlivinglegends.net

Need I say more. No, indeed, I need not. Even not needing to, I'll say what there is to say anyway! For it is that most sacred of franchises – *Mechwarrior*.

It's been so long since a decent Mechwarrior game, and to have one that's not only free but based around the gorgiliciousness [new word!] engine of Crysis is like the Niagara Falls of wet dreams. Well, for Mechwarrior fans anyway.

Naturally, the mod is built around multiplayer and players can climb into a range of mechs for both Inner Sphere and Clan, although infantry combat also features (in fact, you start off sans mech). Games consist of 32 players with 16 a side and – although it's still the beta – some 35 vehicles and mechs will be at your command, each and every one with its own true-to-the-concept model and cockpit. These cover the gamut of light to assault and include classics such as the Commando, Vulture, Madcat and of course Atlas. Vehicles, too, come in a variety including hover, tracked, and VTOL.

The developers behind the mod claim to have mixed the squad system of Battlefield 2, the physics in Crysis, and objective game modes of Enemy Territory: Quake Wars and, despite the obvious focus on giant hulking war machines, infantry will be central to campaigns and essential to winning a map – not exactly a small feat.

Naturally with the Crysis engine the gameplay looks gorgeous, and much like the original tabletop game tactics like aiming for the legs pay off, and there's nothing quite as satisfying as launching an LRM batch and seeing them streak towards your foe. I haven't tried out autocannons yet, but can't wait to see what an AC/20 can do.

Living legends is in public beta, so don't expect miracles yet, but it's certainly playable. It won ModDB's Player's Choice Mod Of the Year 2009, as well as Editor's Choice Best Multiplayer Mod. If you're a Mechwarrior fan, this is simply required installing. Get to it.

PATCH notes

The month's essential patches.

3DMark Vantage v1.0.2 1901 incremental patch for Windows

3DMark 06 v1.2.0 1901 Incremental Patch for Windows

Sacred 2: Fallen Angel - Ice & Blood Patch v2.65.10 to v2.65.20

Mass Effect 2 Patch v1.01

The Lord of the Rings Online: Siege of Mirkwood Patch

World of Warcraft Patch v3.3a to v3.3.2

Borderlands Patch v1.21

Operation Flashpoint 2: Dragon Rising Patch v1.02 Overwatch DLC

Ravenholm

Game Half Life 2
URL ravenholm.wz.cz/english.html

One of the more unique, and scary, levels of Half Life 2 was the doomed town of Ravenholm. If it didn't give you the jeebies, it at least had you on edge, And while some were all too glad to leave it behind others felt they could do with a little more of that Ravenholm loving.

Like the authors behind Ravenholm, the mod.

If you can look past the accents (the native dialog is in Czech, with English subtitles) it does a good job of keeping that Ravenholm theme – namely scaring your pants off. Right from the start you walk out into Ravenholm with no weapons, and quickly run into headcrabs. Your tactic is to simply run, and find something quickly. From there you are gradually introduced to weapons, but all the time you have think about how much ammo you have left and if a weapon is the best tool for the job. If the mod does one thing right, it's getting that survivalist feel to the game.

There's actually a good plot underneath too, and many levels require you to do some complex puzzle solving to get past a section. The entire mod uses resources only from Half Life 2, there are no new textures although there it comes with its own musical score, and so clocks in at a tiny 70MB download – and yet provides at least ten hours of gameplay. And because it's Half Life 2 it runs smooth as butter on any half-decent machine.

Ravenholm was actually released in 2006 and was so popular that the authors started on a sequel – Eye of the Storm, the first episode of which was recently released. After you've played Ravenholm you can jump into Eye of the Storm at **eots.half-life2.cz**.

Final Fantasy XIII

The fantasy that is anything but final makes another visually spectacular outing.

It's been 23 years since SquareEnix, then Squaresoft, published the first Final Fantasy game – an attempt to fight off bankruptcy and save the company from going under. Since then, Square's just about perfected the RPG and pushed the boundaries of computer generated animation at the same time.

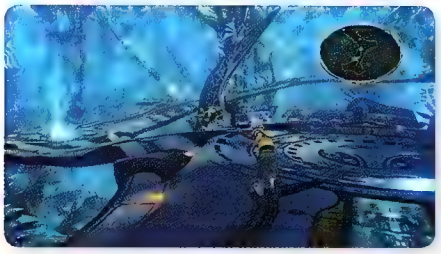
Final Fantasy XIII certainly lives up to its predecessor's reputation for eye-candy, but a franchise that has been going so long cannot necessarily capture lightning in a bottle every time. Despite the various incarnations, which include spin-offs and ventures into the MMO market, FF has really always been about the recreating a similar game experience across the entire series. So... are thirteen games (with another, XIV, a MMO that is already in production) just pushing it too far?

In the latest offering, SqareEnix has made some interesting decisions concerning game play that, in some ways, make XIII significantly different from its most successful games – whether those changes continue to captivate players' imaginations remains to be seen.

Shellworlds and monsters

The game is initially set in Cocoon, a shell world created for Humanity, which floats above Pulse; a vibrant underworld inhabited by the usual array of bizarre creatures. Originally created after a massively destructive war more than a thousand years ago, humanity has lived in fear of the world below; though few today know anything about it at all. Life on Cocoon is controlled by the Sanctum, the ultimate arbiter of life and death.

Powerful beings known as Fal'Cie are aligned with both worlds and have the power to turn humans into L'cie – minions that must carry out their 'focus', or duty, or face a horrific life as a ghoul. So for inhabitants of Cocoon, the choice is simple; spend life terrified of Pulse and under the control of the Sanctum, or risk contamination and expulsion. In FFXIII the game designers have again created a richly detailed history and background, though one that is complex and not easily understood as well. There are factions and rebels and the usual array of good guys and bad guys



– figuring out who is who (or what) takes considerable time.

To allay some of this Square has included a Datalog, accessible through the menu system – this updates whenever important bits of information, history or zones are available, and also acts as a recorded narrative of how your characters actually got into this mess. It's great if you need a refresher on who is doing what and why.

Humanity is cocooned in more ways than one – they are so isolated from Pulse and afraid of it that any contamination is handled by way of a vicious Purge; either relocation to Pulse itself or by death. Our game begins in the midst of one of these Purges, following a determined young soldier, Lightning, attempting to stop the relocation of the citizens of Bodhum, apparently contaminated by the presence of a Pulse Fal'Cie in their dozy seaside town – an event that will have immense and very personal ramifications for every major character.

Gameplay

Where would Final Fantasy be without the ability to summon celestial badgers and various gods and goddesses plucked from the world's numerous pantheons? XIII is no different; summoned Eidolons (powerful apparitions) are able to fight for you and with you directly. You will need to face them and defeat them before having access to that technique, however, and doing so utilises a similar function as the stagger bar for regular monsters. Battles with an Eidolon feature a Gestalt bar that fills slowly and, when filled, enables their capture. Different abilities will fill the bar faster or slower depending on which Eidolon you are faced with.

An excellent addition to the generic summon system of previous versions is the combined attacks by the Eidolon and its summoner; the Eidolon Odin, for example, transforms into a horse which carries Lightning into battle for powerful combined attacks. Stringing sequences of these attacks together for chain damage is a welcome addition to the battle system – it's a bit like having a fighting game lodged within a turn-based combat system, and it continues until the Eidolon's gestalt bar diminishes and they are released.

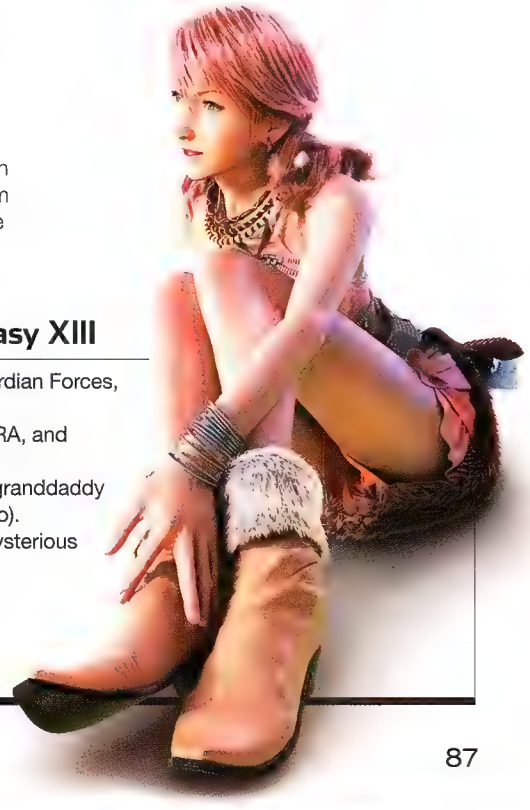
Active Time Battle makes a return in Final Fantasy XIII, which FF vets will recognise from earlier versions of the franchise. But this time it's lifted somewhat by the inclusion of the Paradigm Shift; a technique that changes the specialisation of each team member for best results. Each character has a selection of roles available to them, with different roles becoming available as the character progresses; Commando, Sentinel, Ravager, Medic, Saboteur and Synergist.

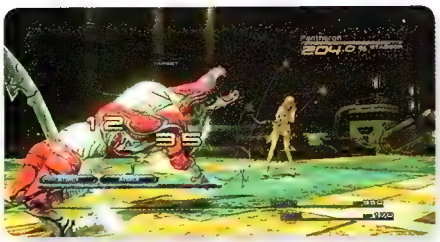
Rather than have all spells available to each character, roles are assigned via the Paradigm Shift and can be changed through the course of battle. This is great fun during those longer boss fights, where careful planning is needed for damage dealing, or knowing when to switch to more protective or healing combinations to stay alive. However, only the party leader has direct actions available to them through the ATB selection. So, if Lightning is in your party and designated as leader you will choose her attacks or actions only – other characters will follow her lead based on the roles assigned to them via the Paradigm Shift.

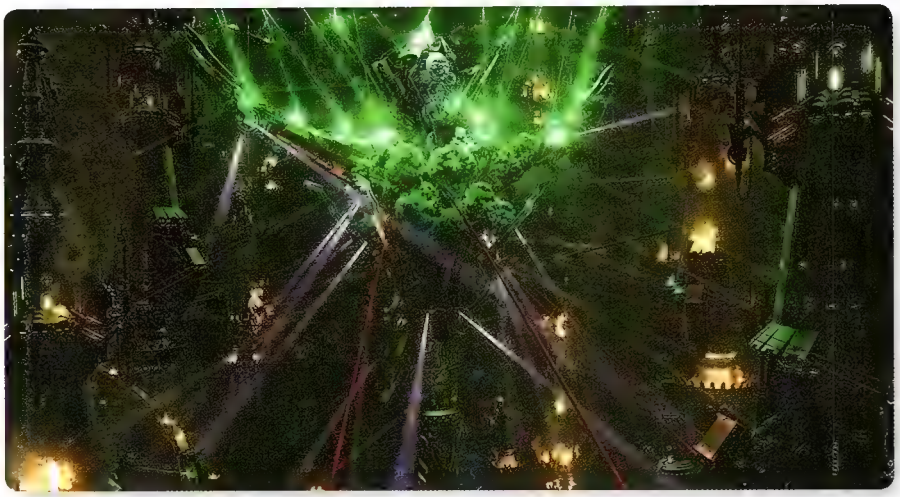
The decision to run the party in this way leads to some positive and negative outcomes, however. Should the party leader die it's game over (though you can make an immediate retry) so even if other characters live, they can't resurrect the leader with a Phoenix Down – this is frustrating if you're used to having that capacity. Similarly, extended fights in which multiple characters die and are resurrected

The characters of Final Fantasy XIII

Lightning – A former soldier from the Guardian Forces, and main protagonist for the game.
Snow Villiers – Leader of rebel group NORA, and tough guy in the team.
Sahz Katzroy – Former military pilot and granddaddy of the group (look out for his baby chocobo).
Oerba Dia Vanille – A young girl with a mysterious background, she also narrates the story.
Hope Estheim – A young boy, rescued by Snow from the Purge.
Oerba Yun Fang – A spear-wielding l'Cie from Sanctum.







had a certain drama – without the ability to resurrect the leader, this drama seems lacking. A more positive aspect is not needing to micro-manage every step of the battle; party members will just do what they're supposed to do – heal, deal damage, shield the team or provide those oh-so-handy-dandy buffs.

You'll also want to pay attention to the Stagger bar for each monster – damaging attacks gradually fill this bar, and when it's full the creature is staggered – open to massive chains of damage that quickly run down its HP. This is great fun, but you'll need to keep an eye on your health, as big-damage Paradigms such as Relentless Assault or Doublecasting leave you without healing. Eventually you'll need to swap into a more survival-oriented Paradigm such as Diversity or Yin and Yang – but that will lower your ability to fill that stagger bar and score tasty criticals.

Building a better you

Maintaining a Paradigm that creates better possibilities for staggering a mob will help you in the long run – points are awarded after each fight based on this ability so lazily chipping away at a monster won't do you any favours when it comes to levelling and learning new abilities via the Crystarium. Is this a good choice? While it does seem to pigeonhole players into playing a very particular way it does make the game a little more exciting by ensuring that every character in the party is always at full health.

The Crystarium, much like the Sphere Grid in FFIX and other job systems, is the platform through which characters advance and learn new skills, spells and Paradigm roles. Crystal Points awarded after battles advance characters along specific tracks between Crystal sets, but players can choose what role the party members actually advance along - if you have a character who mainly heals it would seem smart to boost their Medic abilities – but be warned, you won't always have control of who is in your party.

Telling it straight

In an effort to keep things fresh, perhaps, Square has made some interesting choices about story progression and game play in FFXIII and those choices will have a big impact on whether this game is successful or not for a lot of fans. Unlike previous incarnations

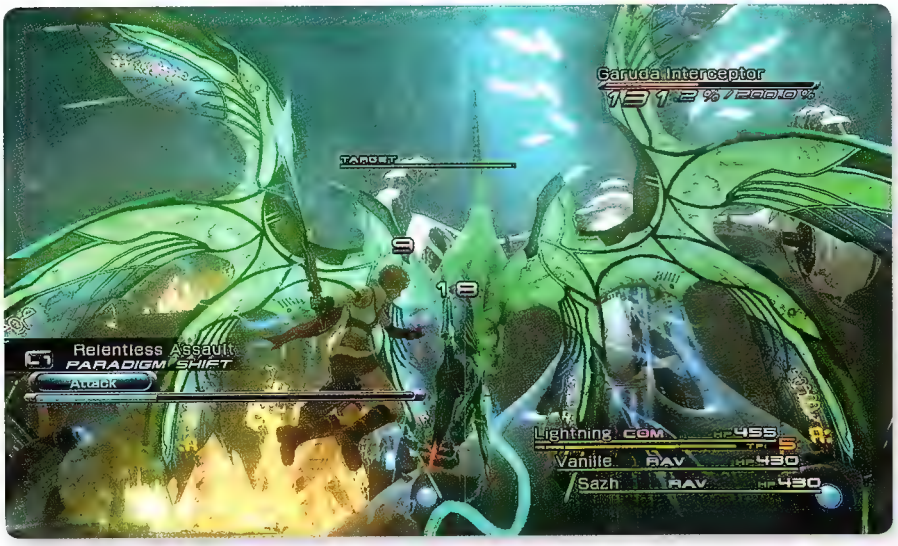
the first half of XIII features little to none of the usual sandbox environment expected in a Final Fantasy game. From the first moment characters are carried along rigidly designed paths with no room for variation or choice to travel into cities or towns. Similarly, interaction with NPCs in flashbacks is extremely limited.

When this facet of the game was revealed in early reviews, FFXIII director Motomu Toriyama defended this decision by saying to XBox World 360 magazine that "We think many reviewers are looking at Final Fantasy XIII from a western point of view... When you look at most Western RPGs, they just dump you in a big open world, and let you do whatever you like..." He also added that it becomes very difficult to tell a compelling story in those conditions.

This is a significant break from previous level design ideas and, simply, has a drastic effect on playability. Early levels often feel like a series of battles down a single corridor, and makes the game feel rushed, as though players are being forced to a very specific point before being given free licence. That may very well be SquareEnix's ultimate intention here, although previous Final Fantasy games were able to tell those compelling stories while allowing a more open world as well as numerous side quests and mini-battles.

The high numbers of cut-scenes in XIII, while beautiful and very successful at forging strong character development, sometimes feel like an attempt to alleviate the boredom of facing the relentless storytelling. Perhaps Square really want to venture into feature film again, it's been only a few years since Final Fantasy: Advent Children, but the technology has come a long way even in that short time.

Ultimately there's more than enough here to satisfy diehard fans, but there's also the lingering feeling that the freedom that typified the earlier classics – like VII and VIII – has been sacrificed on the altar of storytelling. And for not much improvement in the end. Perhaps we *are* just dumb gaijin, but while XIII is strong, it's not nearly the glorious return to form that fans had been hoping for. **LS**



PS3

Developer Square Enix
Publisher Ubisoft
Website www.finalfantasy13game.com/

Graphics 96
Visually stunning; really shows what high-definition gaming is all about.

Gameplay 79
The Paradigm Shift is a great inclusion, but rigid storytelling

Sound 85
Quality audio with the usual inclusion of FF piano themes and battle music.

Overall
Flaws in gameplay construction don't detract from the visual feast or renewed, tactical ATB.

80%

Heavy Rain

atomic hit award

Can a game be about more than killing stuff?

Heavy Rain is a very difficult game to approach. At its baseline, it's an interactive movie with a strong reliance on quick-time events, and as bad as that sounds, given the track record of games incorporating these ideas, in this case it's a really good thing. It's more of an experience than a game. As such Heavy Rain will no doubt polarise people – if it doesn't click for you it quickly becomes a grind, especially given the slow start to the game and the fact that gameplay mechanics and big action set pieces take a back seat to getting the story across.

I shot the sheriff

The plot of Heavy Rain can best be described as an intense noir thriller revolving around a serial killer, nicknamed 'The Origami Killer'. Young children are kidnapped, and days later are found murdered in the same way: drowned near a railway line with an orchid on their chest and an origami figure in their hands.

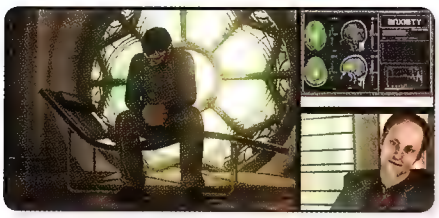
You start as Ethan Mars, stepping into his shoes as news of your missing son is delivered – he may be be the Origami Killer's latest victim. Ethan has only days to try and find his son and the central question that Ethan and the other characters must answer is "How far are you prepared to go to save someone you love?"

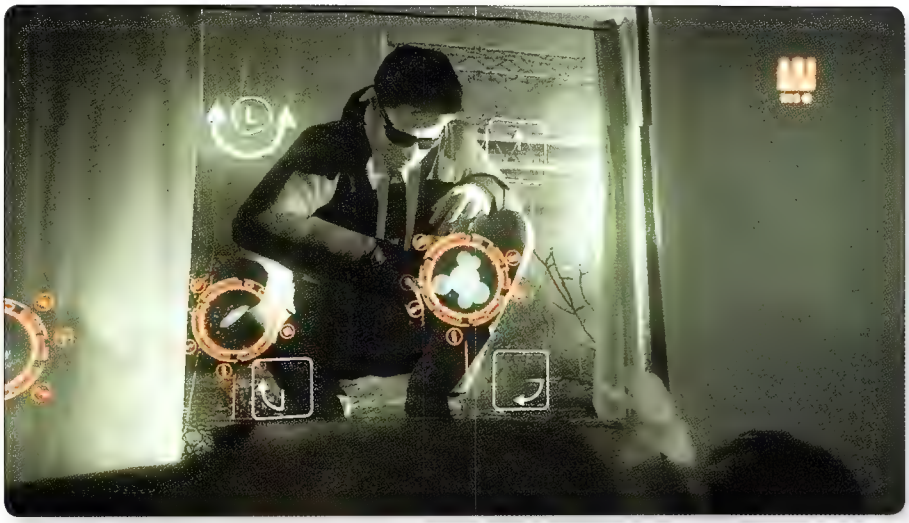
Along with Ethan, there are three other playable characters. Private investigator Scott Shelby, FBI agent Norman Jayden and insomniac photographer Madison Paige; all have access to differing experiences and mindsets that flesh out the story. While unique and initially unlinked, these characters develop their own reasons for becoming involved, and their own motives for wanting to track down the Origami Killer. The story starts slow, setting up the ideology behind Ethan and why he is who he is. While important in explaining the motivations of the character, this can feel off-putting at times. Things soon pick up pace as the plot begins to unravel and the characters are all slowly drawn into the gravity of it all. We can't actually say too much – as pretty much mentioning any part of the story would be a massive spoiler!

Have at you!

Dialogue plays an important part in the game and is handled uniquely. Dialogue options will float around the character's head, and you choose them by pressing the corresponding button. This works well as there is no pop-up dialogue box to interrupt the flow and break connection with the character, with text animated clearly if the character is relaxed, but fuzzy and rushed when under stress, immersing you further into the character.

The game jumps between all four characters scene by scene, and you take direct control of them. Character control works well, however it





can be a bit jarring at times given the often fixed camera perspective (à la Resident Evil) when the camera suddenly cuts to a new angle, leaving you disorientated and often walking in the complete opposite direction. Beyond this, the major interaction with the character is through quick-time events (QTE). For example, if you approach a jump while running, flicking the right stick up when prompted will allow you to jump the hurdle. Same as if someone hurls a punch at you, pressing a button will block or flicking the stick will evade. These QTEs organically fit with what is going on and allow you to appreciate the scenes that the game presents. You are able to sit back and watch the incredibly detailed scenes and soak in everything that is happening, as you would in an intense film – while still feeling like you have a vital role in deciding what happens and how the story pans out.

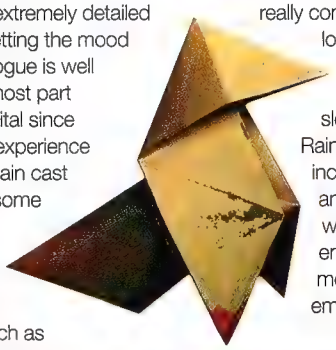
Do not pass go

Unlike many games using QTEs, you are not frustratingly thrown back to the beginning of the level should you fail to match the sequence. Nothing breaks the flow of the story, there is no end game screen nor is there any wrong way to go about tasks. Events simply change and adapt to how you play the game. Decisions you make, and tasks you fail or choose to ignore, have implications down the track and the game does a brilliant job of really making you think about your actions, as they will actually affect what is going on. The game is a personal journey and its direction and ending depend on the way you play. We aren't talking different pre-rendered cut scenes either, but dramatic variations on how things go down. Main characters can die and will stay dead; closing off certain paths of the story, but opening up other ones based on the impact the death will have on the environment and the characters left behind.

The game's graphics are extremely detailed with vibrant environments setting the mood of each scene well. The dialogue is well written, natural and for the most part expertly delivered, which is vital since so much of the Heavy Rain experience is focused on it. While the main cast voice acting is spectacular, some of the supporting cast leave a little to be desired. Character models are incredibly realistic and very emotive, but other things such as clothes and objects lack the detail and animation that's been pumped into the character's faces. Lip-syncing is mostly great but feels slightly off at times. These negative points definitely aren't deal breakers, and only really stand out because of how well everything else is realised; a testament to the quality of the experience overall.

Quantic Dream has struck a nice balance between giving the player enough freedom to determine the path that the characters will take, while also maintaining the direction that the overarching plot itself must take. The game takes around 8-10 hours to finish, which allows the intricate story enough time to develop and grow, but doesn't outstay its welcome – and really compels you to play through till all loose ends are tied up.

While not for everyone, given its reliance on story and often slow pacing, if you allow Heavy Rain the time it will draw you into its incredibly twisting, involving story and spit you out the other end with a realisation that interactive entertainment can be a viable medium to tell a dark, mature and emotional story. **DW**



PS3

Developer Quantic Dream
Publisher Sony Computer Entertainment
Website www.heavyrainps3.com

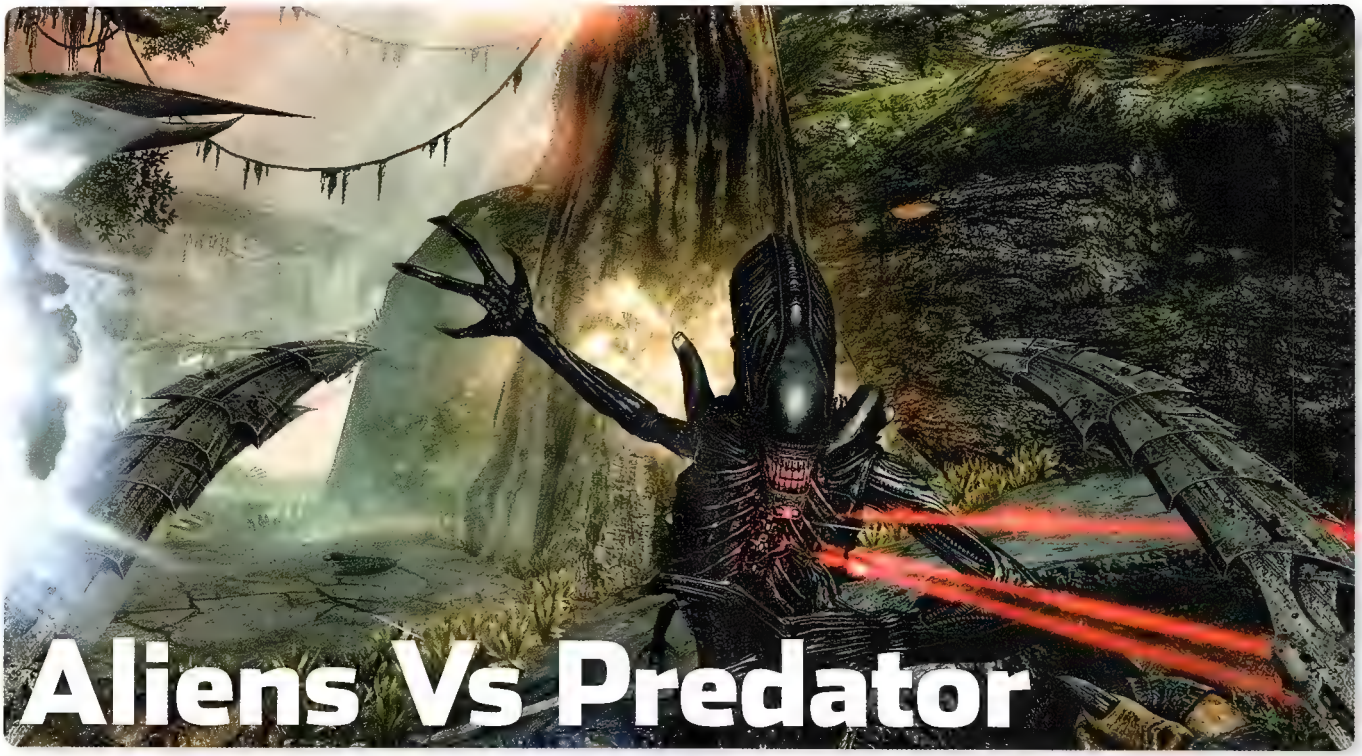
Gameplay 92
Brilliant adaptable story that draws the player in.

Graphics 89
Beautifully detailed graphics and animation.

Sound 84
Great ambience and solid voice acting.

Overall
A landmark piece of interactive storytelling.

91%



Aliens Vs Predator

It's like rock scissors paper with pulse rifles and plasma cannon. Just not that cool, though.

The AvP franchise has a fascinating history; one whose origins are likely lost in the mists of time. The first hint of a crossover most fans saw was a startling reveal in the last act of Predator 2, though comic creator Chris Warner says he and his pals were talking it up in the late 80s – though the film beat them to the punch. Since then, it's been a rollercoaster of novels, comics, and eventually two official films – and, of course, a mess of classic games.

Rebellion was behind the original and groundbreaking AvP games, and it's the brains behind this latest more or less reboot – there's no one, two or three appended to this game's title. That said, its pedigree is spotless; not only are many of the devs veterans of the original classic, but fans of the films will recognise the gravelly voice of Bishop himself as the head of the ubiquitous Weyland-Yutani corporation.

But that's also part of the biggest problem with the game – as gorgeous as the new graphics are, the game itself breaks almost no new ground. Once again Weyland-Yutani is poking its nose in where it's not wanted and messing with Xenomorphs, the Predators are on the hunt, and the Marines are caught in the middle.

Again.

Drake, we are leaving!

We had concerns about the control scheme in the Marine portion of the game, especially the ballistics modelling, when we previewed it last issue; sadly, it's still the same.

It's highly frustrating – for all its lack of originality, there's still a seriously visceral sense of fear in the human campaign. All the cues are there to get you wishing you'd put the brown trousers on, from the pinging motion tracker picking up not only on bugs and hunters, but also stuff you kick around yourself. There's the music, too, which is awesome, and all the classic tricks to make you leap out of your skin – but then you need to arc up at something and you feel like it's your first session at the range, rather than a highly trained bad-ass marine.

The devs more or less admit that they've skewed the gunplay, too, by giving you that lamest of FPS crutches, the pistol with unlimited ammunition. It's a pretty shitty pistol, but it'll save your life more than your Pulse Rifle, and, frankly, that's pretty ridiculous. After all, as Hicks tells us in Aliens, "I wanna introduce you to a personal friend of mine. This is an M41A

pulse rifle: 10mm with over-and-under 30mm pump action grenade launcher." Close personal friend? If he'd been using the same thing foisted on us in AvP's human campaign it would be his worst enemy – it's inaccurate, lacks stopping power, and will generally take an entire magazine to drop a few bugs.

Short controlled bursts my arse. More like spray and pray, then fall back on your pistol.

On the upside, it's possible to shoot away limbs and weaken or slow xenomorphs to headshot them; plus there are more accurate weapons further into the game – but to see the almighty Pulse Rifle so poorly treated is just plain galling.

Hack, slash and plasma

The two alien campaigns are a bit more rewarding, especially the Predator's. While the Xenomorph is a purely melee and stealth specialist, the Pred mixes tough hand-to-hand and stealth with some of the most powerful ranged weapons in the game. The ability to get up close to even raging xenomorphs makes Predator play feel really special – there's nothing quite like being able to take down a whole swarm with your bare hands.

But as fun as the gameplay is, there's still that issue of the basic story being the same. Humans wake up ancient evil (the xenomorphs), predators clean it up, but wait, there's a twist.., which of course we won't reveal, but it's the kind of thing you'd expect if you've seen any of the films.

Is this the only story we can have in this universe? You have to wonder how Weyland-Yutani is still managing to operate after so many massive failures and xenomorph-husbandry – surely its stock has plummeted on the galactic exchange and no one is willing to work for them anymore! Why are the Predators always portrayed as some kind of alien Batman, quietly waiting in space for their alien-phones to ring and for a fight to get into?

And, finally, there's the matter of every Marine campaign opening with a bad drop – is there any other kind? Or does the Colonial Marine Corps expect a 90 per cent fatality rate for every mission? There's some great mechanical aspects to the game – good engine (though prone to some frame-rate issues with the motion blur effects), some nice touches in the alien campaigns and DX11 – but there's no emotional heart.

Friends make it better?

But what about getting together with some live players and causing some mayhem?

Well, don't hold your breath. The Quickmatch option, looking for any game type, got us into a server lobby with three other players, all waiting for another four. And waiting...and waiting...and waiting..... so we thought we'd try looking for any dedicated servers. It's great that AvP does support this... but we couldn't find any.

And by the time we got back to that lobby with the three other players waiting, they'd gotten bored and buggered off. Which seemed like a really good idea to us. By all reports, AvP multiplayer just isn't that good, and while we've not been able to judge for ourselves, the deafening silence of the game's online presence speaks eloquent volumes.

Oh well, maybe Gearbox's Colonial Marines will bring something fresh to the franchise, assuming it ever hits release. In the meantime, you'd be better off revisiting Rebellion's earlier AvP 2. As of last year it was still getting love from the modding community. In fact, we're in the mood for that now... **DH**

Xbox, PS3 and PC (reviewed on PC)

Developer Rebellion
Publisher Sega
Website www.sega.com/games/aliens-vs-predator/

Gameplay 62
Poor story and kludgy human controls let the game down.

Graphics 89
Very atmospheric, with some clever ragdoll effects.

Sound 87
Those old effects and themes still scare the bejesus out of us.

Overall
A very disappointing effort from a team that should know better.

67%

Supreme Commander 2

Gigantic walking robot crabs contained within.

The crux of SupCom2 revolves around the struggle between three opposing factions; or more accurately, their commanders. You'll slip into the comfortable shoes of the United Earth Federation forces first off, and the basic gameplay concepts are explained to you through multiple lengthy unskippable cutscenes. Your name is Dominic Maddox, a curious commander with a constant expression that suggests someone has piped pure fart gas into your Armoured Command Unit, or ACU. Wandering onto a training course, automated battle planes and tanks attack you, and you're suddenly hit by missiles and found to be unconscious.

From here you descend further into strangeville, as Dominic dreams about his wife who nags him about coming home... where you wake up, call your wife, and have her say much the same thing again. The cutscene confoundingly ends with you walking offscreen awkwardly joking with your wife – hinting at what is the most disappointing element of the game. This poor voice acting, terrible writing and frankly mind-boggling series of events are loosely tied into the missions to the point of confusion, with many occasions where we'd rather chew on a muddy soccer boot than watch another stilted interchange. The UEF campaign is wholly tutorial-esque, and once completed you'll be left wondering why you bothered completing the missions – apart from Steam achievements we didn't really feel that we were saving anyone in particular.

However the other campaigns do pick up a little, and the missions aren't always boring. They can feel a little cookie-cutter sometimes, like stay-at-x-location-for-x-amount-of-time-without-dying, but there are a few gems that stand out as overwhelmingly fun. Part of this comes from a rethought emphasis on your economy; no longer do you need to ensure that Mass Extractors have enough capacity to maintain upkeep, instead focusing on simple money per second income. Energy is another concern, and striking an efficient balance between production of both resource is at once easy – and important. Without enough infrastructure your factories will grind to a standstill, and in SupCom2, that spells your defeat. All your buildings and defences can be built from the ACU, and you'll be able to supplement your infrastructure needs with Engineers. If the ACU is killed, you lose the game, though this can be altered in multiplayer modes.

In the previous SupCom, you would pump out units at a lower level (referred to as Tier), and ultimately research your way up the ladder to the high-end experimental units, also the most badass and powerful units in the game. However cool, this meant that you wound up never using the original units, and half the time just sent them to their death to free up unit cap. SupCom2 reinvigorates this system, and rather

than obsolescing units that are available from the word go, you can simply research global upgrades to make them viable again. Land, Air, Sea, Structure and ACU upgrades are available in a tree hierarchy that only unlocks the more powerful upgrades once the basic ones have been researched, and strategies will need to be structured around which particular fighting force you choose to be your strength, mixing gameplay up considerably.

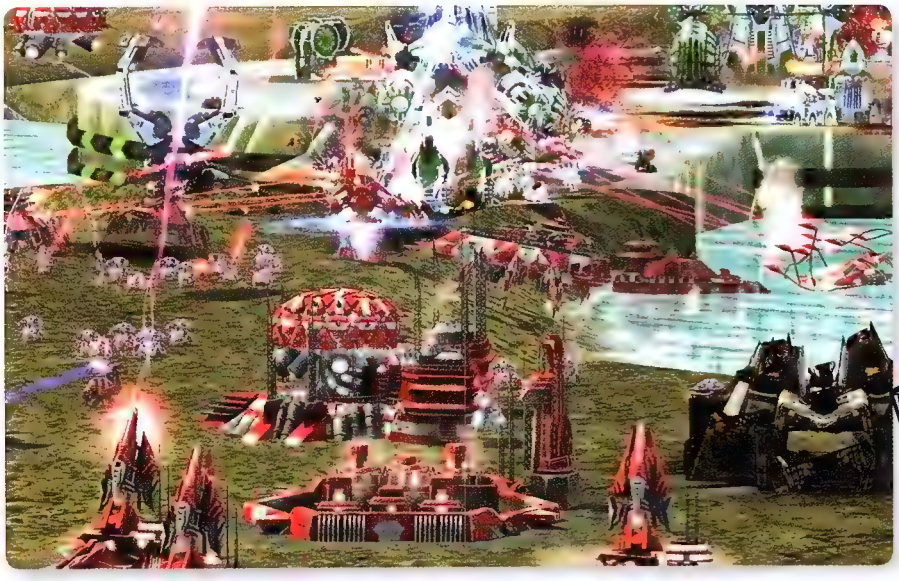
Combat is the one area that is furthest removed from traditional RTS gaming, with very little focus placed on a per-unit or per-squadron battle. Instead, you'll be much more likely to win if you have the right *kind* of units in the right numbers in the right place, something that needs to be juggled across multiple battlefronts at once. This scale is controlled with the scroll wheel, bringing you smoothly from close enough to touch units, to hovering a few hundred clicks above the battlefield. Units and squadrons are reduced to simple characters and numbers, giving an easy overview of things and allowing coordination across the map – which can be immense.

Because of the emphasis on the right kinds of units, or perhaps as an accidental by-product, we found that actually figuring out what kind of units we had was a headache. Even the unit selections from factories didn't always show the unit's abilities clearly, and trying to select specific units from any viewpoint that wasn't pressed against the ground was nigh on impossible. There's at least a nice variety of stock units and upgradeable units to play with, and the experimental units are just as fun to play with as ever. A mix of land, air and sea is needed to both expand and secure additional land, and you'll be rewarded for aggressively securing more resources with a higher capacity to produce units. And ultimately, getting sheer numbers against your enemies is a strategy that is pretty guaranteed to work, unless they happen to nuke you.

Most aspects of the game seem surprisingly polished, especially unit animations. While the models themselves won't win awards for their appearance, we had up to three hundred units on screen at one time at a framerate that wasn't significantly reduced compared to relatively quiet scenes, and the potential for massive-scale battles is finally realised here in this tweaked and hardware-friendlier engine.

SupCom2 also makes use of DirectX 11, though exactly which changes this brings wasn't easy to determine. Not mentioned anywhere in an official capacity at time of writing, we could only really see DX11 effects being used in the wake from transport ships, though this was only observational. For those out there lucky enough to have two monitors, a strategic map can be run on the secondary screen.

Based purely on the amount of fun that we had while playing the game, SupCom2 is placed in an awkward position. It takes every element to bring unit management, economy and production efficiency and objective completion together and when it does, it's an immense amount of fun. However this didn't happen very often, and there were points where we were tempted to quit from frustration at the controls, or curious pathfinding glitches that would send units the wrong way, or enemy AI that seemed to be granted unending units without needing to actually have the infrastructure to produce them. It's a game worth playing, but only if you're after something higher in scope than your average RTS – and for those who game on the Xbox, we pray for you. **JR**



PC, Xbox 360 (reviewed on PC)

Developer: Gas Powered Games
Publisher: Square Exix
Website: www.supremecommander2.com

Graphics 90
Not the highest detail, but definitely the widest scope.

Gameplay 70
Ranges from 'just right' to 'ragequittin' time'.

Sound 80
Cool sound effects, but the soundtrack is average and oftentimes absent.

Overall:
A fun enough experience that proves change can be a good thing.

79%

Bioshock 2

Is this a truly rapturous return to form for the series?

Bioshock came out of nowhere and presented one of those truly rare things in a gaming – a unique gameplay experience coupled with a truly one-of-a-kind setting and story. So with that in mind, the sheer excitement about the release of a sequel that would let you experience the underwater city of Rapture from a whole new angle, as well as introduce multiplayer action to the franchise, has been intense.

But all that hype can sometimes work against a game, and it certainly seems to have hit pretty hard in this case.

Bioshock 2 puts you in the clumpy boots of one of the iconic characters from the first game –a Big Daddy. And not just any Big Daddy, either, as you'll learn during the game's opening sequences: you're one of the first of the breed, blessed with a degree of independence that the rest of your brethren lacked.

But you also start the game, well... a little dead, after being caught up in the machinations of the scheming Sofia Lamb. It's during this opening scene that Lamb takes your Little Sister, setting up the central conceit of the entire game – that you're constantly attempting to find and rescue her.

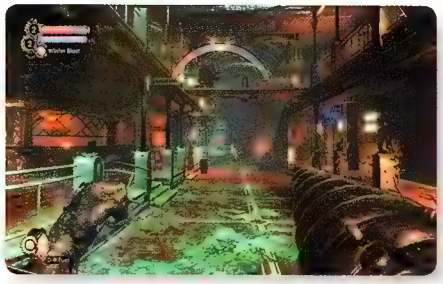
Death, thankfully, is not final, and after ten years you mysteriously wake up to continue your quest through Rapture's flooded and shattered chambers.

Story time

One of the neatest tricks of the original game was the drip-feeding of information from the city of Rapture, and what went wrong there. That shine is more or less missing from Bioshock 2 – despite some great level design, the basic setting is just the same, and the much-vaunted ability to now traverse the crushing depths beyond the city are all a little... well, lame.

The art-deco stylings have been defaced over the years since you last visited Rapture though – Sofia Lamb's philosophy of collectivism and rebirth runs diametrically counter to Andrew Ryan's original dream of individual freedom and creativity, and her followers have left graffiti all over the joint. Spooky stuff like hundreds of butterflies pinned to walls (where did the butterflies come from FATHOMS BENEATH THE SEA, THOUGH?!), or reassuring mottos like "Give yourself unto Lamb!".

In that decade now gone, she's not only won over the loyalty of Rapture's surviving (though



now more mutated than ever) citizenry, but also overseen the growing adolescence of the Little Sisters – who are now armoured monstrosities in their own right, aping their lost Big Daddies (and man, it can really start creeping you out just writing this stuff). When you wake up it seems you're at the center of a move by one of the more healthier residents of Rapture – one Brigid Tenenbaum. She's discovered that the Big Sisters have been kidnapping children from coastal regions on the surface to create more Little Sisters and... you get the point.

Rescue your own Little Sister (called Eleanor), stop Lamb, kill anything that moves, and hack everything else.

Drilling into fun

In the first game, tangling with Big Daddies was a dangerous affair, thanks to their heavy mining drill. Now, you get to play with one yourself, and it's just one of a huge arsenal at your disposal. Each weapon can be improved and upgraded as you play, adjusting for damage, accuracy and ammo count. The standard weapons alone, along with neat ammo types like Trap Rivets, would be enough to please any FPS fan, but one thing that Bioshock 2 does excel at is in the relation between its weapons the more supernatural powers you can unleash.

Previously, you had to juggle between plasmid powers and normal weapons, but now you can dual-wield both, with some impressive results – like freezing splicers before either shooting them to pieces or simply spinning up your trusty drill to shatter them apart. With the different types of enemy on hand, each encounter is a mini-strategic masterpiece, and even better are the moments where you get to hold your ground.

One of the key things in the game is harvesting Adam to fuel your powers, and to do that you need to befriend a Little Sister, get her to find an Adam-rich corpse, and then set her down to extract it. Of course, this calls greedy splicers from all over, and you'll need to carefully prepare for the rush.

A lot of the alternate fire modes of weapons, like the aforementioned Trap Rivets, let you seed and area with a field of death, made even more nasty by the ability to power up each trap with your plasmid powers. Want to electrify someone before an explosion blows them into a pool of water, while another trip first freezes then catapults them into the air? Easy done.

But each rush can be pretty harrowing, so careful consideration of your weapons and the environment is crucial. These are thrilling fights.

Not as thrilling, but certainly challenging are the moral issues – you can save every Little Sister you come across, but that may leave you short on Adam. You can use them to harvest it, and fight off hordes of jonesing Rapture-ites, or you can kill them directly for a quick Adam boost. Combined with some tough choices late in the game, these decisions directly effect the game's outcome. It's not nearly as epic an impact as your choices in, say, Mass Effect 2, but it's satisfying nonetheless.

Something that's not nearly so satisfying is the multiplayer game, which we were really looking forward to. In reality, it's hard to care for anyone when both sides are slobbering maniacs wanting to kill little girls – though perhaps that's just us. The fact that everyone has the same range of weapon and plasmids open to them makes for over-complicated fights, too.

At the end of the day, there's more than reason enough to play through all of Bioshock 2, but it's simply not as solid an experience the second time around. So what will Bioshock 3 bring? Well, we're at least still curious about that. **DH**

Xbox, PS3 and PC (reviewed on PC)

Developer Various 2Ks, plus Digital Extremes
Publisher 2K Games
Website www.bioshock2game.com

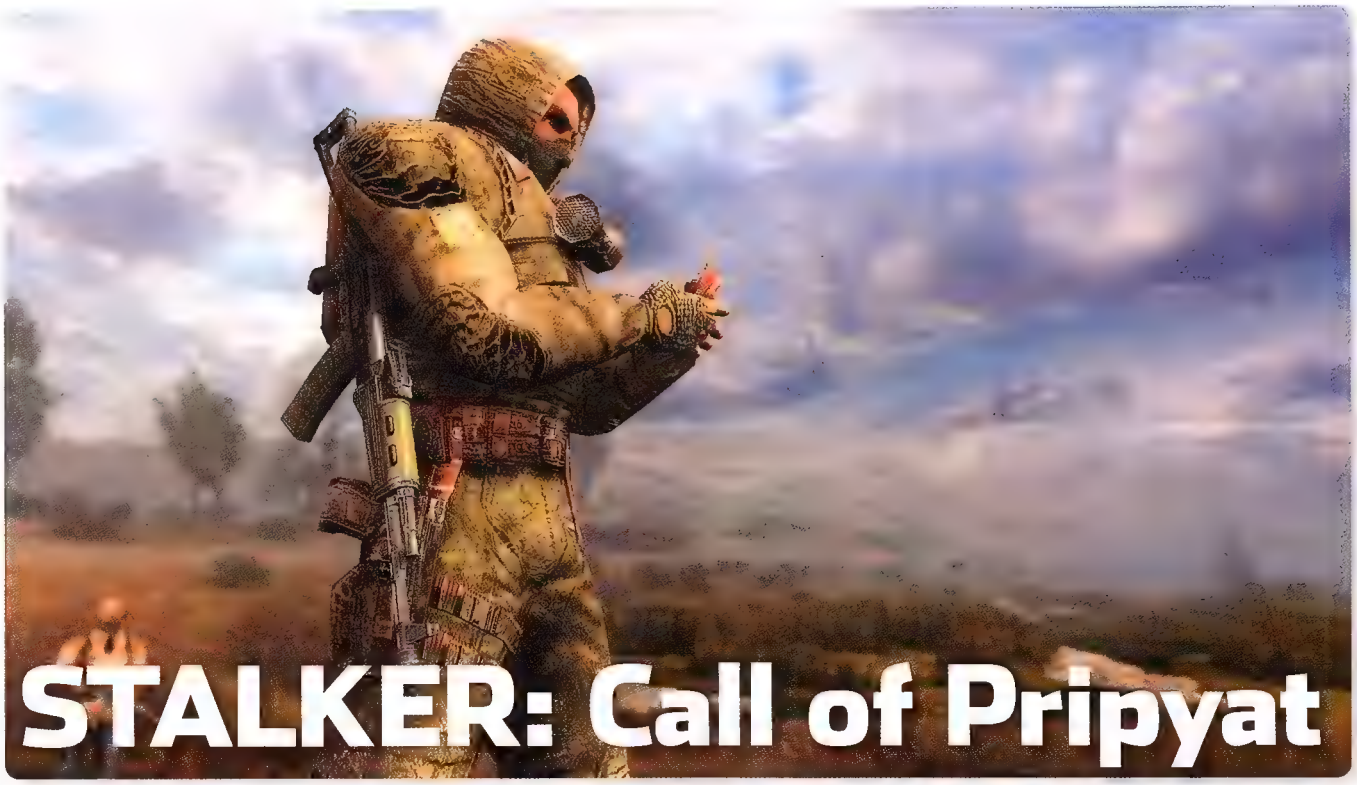
Gameplay 89
Engrossing in singleplayer, but lacking in multi.

Graphics 81
Very atmospheric, but Unreal 2.5 is starting to show its age.

Sound 89
Always spooky, with great period touches.

Overall
The story may be a little old, but this game still demands attention.

84%



STALKER: Call of Pripyat

More of the same – great for fans, perhaps not for everyone else.

In spite of the tedious delays to its launch – hell, maybe because of just that dogged attitude – we really wanted to like the original STALKER: Shadow of Chernobyl. We really wanted to like Clear Sky, as well, and, true to form, we really want to like the latest in the series – Call of Pripyat.

But exactly like the previous games, despite our positive intentions and promises to love and respect Call of Pripyat in the morning, we're just not going on a date with it again.

It's that same issue, which leads us to think that Eastern European developers have an attitude to game design as impenetrable and alien to the free western (okay, the Cold War is over, but let me enjoy my pointless commie-baiting!) mind as that of the Japanese design ethic – for all its graphical splendour, wide open gameplay, and truly interesting plot, the biggest issue with STALKER has always been its difficulty curve.

Missed me!

Many games use the drip-feed method to adjust difficulty levels. The tougher the designers want the game, the wimpier your weapons will be. But STALKER has always taken that mindset to the nth degree – often you can waste an entire clip and not end up taking down your badguy. A badguy, it must be said, is likely to be armed with the same weapon, but blessed with remarkably more reliable accuracy. One early conflict in Call of Pripyat had not only a more accurate enemy, but one with a GIGANTIC SHOTGUN to boot. He could double-tap us, but our pesky AK took about eight rounds to kill him. And since we had to open a door to get at this guy, it was a tough little fight with many respawns. Yawn.

Another issue, wonderfully illustrated by this encounter, is the lack of polish in the game. We noticed our shotgun-armed pal's arm clipping through the door as he waited to for us to open it, so we shot it; he backed off, waited, then stood at the door again. We rinsed, we repeated, he fell over dead.

Exploiting for fun and profit indeed.

Other early encounters seem similarly purpose-built to show you just how shitty your loadout is, like the mutant beasties who can slip into invisibility mode, and can take about five of the shotgun blasts that would have killed me in a single shot. And this is meant to be fun?

The icing on the cake here seems to be regular instances of widespread radioactive anomalies that blanket the entire landscape, and will KILL YOU DEAD if you don't find cover. So... what counts as cover again? Well, we can tell you that a freight container, as cover-like as it might look, is not it.

Hit me...

The artificially boosted difficulty is made doubly annoying by just how well the GSC Gameworld team has refined the rest of the game. The world is truly open and wide, with a range of terrain types and terrors to content with – they may be stupidly hard to kill at times, but there's a lot of them, at least.

The inventory system is much smoother this time round as well, and it's easy to hotkey things like medkits and rad medication. The limitation of only being able to carry two weapons plus knives and grenades at any given time is a lovely touch, and exacerbated by the ability to carry a range of tracking devices that further limit you to one handed items. In fact, if you spend any time getting into proper artefact hunting, you'll likely spend more time with a rusty bolt in one hand and something looks like a Mad Max prop crossed with a Tricorder in the other.

The faction system introduced in Clear Sky has been trimmed back to be less obtrusive, but it's still present in the game world. As you explore the blasted landscape, random gun battles will break out that you can either join in on, avoid, or wait around to profit from. If only the rest of your NPC interactions were as elegant, though – the game suffers from some very poor voice acting, and a lot of re-purposed text-based dialogue.

The game delivers graphically, with the rolling and/or shattered landscape looking wonderful on our 4870X2-powered NRG systems. The game uses the 1.6 version of the X-ray engine; 1.5 was in use in Clear Sky, and 1.6 supports the shiny new DirectX 11, in particular its advanced tessellation techniques. We're looking to upgrade our test machines shortly, so maybe this will get us back to the game...

Still, the iterative development of the engine does appear to be hitting the limits of X-ray. If there is to be a fourth game in the series, as good as it looks we still hope there'll be a jump to 2.0.

Quit me

Ultimately, it's a mixed bag, and not like of those tasty mixed bags you can get with lollies in them. We know that STALKER has some really passionate fans, but we just can't grok it. Since those fans have stuck around since the first game, through the prequel, and are now waiting for this, we can only assume that since we still find STALKER just a touch too much trouble to be worth playing, that they'll lap it up, one inaccurate gun after another. And sure, they'll likely be super-pleased once the game moves on and things fall into rhythm and get a lot more accurate – but we just don't like feeling like we have to earn the right to play a game.

But we still like the fact that Vodka can heal you – that's a gameplay element we can get behind. **DH**

PC

Developer GSC Gameworld
Publisher All Interactive Entertainment
Website http://cop.stalker-game.com

Graphics 79
Still pretty, but the X-ray engine needs some love.

Gameplay 73
Some nice touches, but just too over the place.

Sound 65
Get. Better. Voice Actors.

Overall: 74%
Maybe we'll like the next one...

Napoleon: Total War

atomic hotaward

Empire was awesome – but Napoleon is AWESOMER.

We're pretty much one of the biggest Total War groupies you can find. We've been playing the series since falling in love with the original Shogun, have messed around with modding the game to within an inch of its life, invaded France more times than we can actually count, and we still get thrills thinking of some of the epic battles that we've won and lost. So when Empire finally brought the series up to the blackpowder period of the 18th century, you might think the game had reached its peak of getting us excited. Well, as good as that game was, you'd be wrong – Empire, for all its scope and complexity, is a mere prologue compared to Napoleon: Total War.

Napoleon is technically very similar to Empire. There's the usual turn-based campaign map to negotiate, with towns to improve, trade routes to secure, and territories to invade. The real-time battles are also cosmetically the same – even the uniforms of each nation don't deviate that much from Empire to Napoleon. But what's happened between the two games is nothing short of a complete AI overhaul, along with tweaks to the graphics engine, and a vastly downshifted timescale to represent the more tumultuous period of the early 19th century.

In a very real sense, the game requires a complete rethinking of tactics.

Ability is nothing...

Napoleon Bonaparte was the terror of Europe. To put it simply, he pretty much pwned every great power in Europe, from Italy to Austria, and the names of his great battles are by-words for military prowess – Austerlitz, Wagram, Eylau. N:TW presents three campaigns from three very different periods in the great general's life: the early Italian Wars, his campaigns in Egypt, and then the final Campaigns of the Coalition, when pretty much all of Europe, including England and Russia, joined together to try and bring the then Emperor Napoleon to heel.

There's also single battles, for those who simply must try their own tactics in some of the classics – think you can do better than Napoleon at Waterloo? Now's your chance.

But, for us at least, any chance to play England and lay siege to Paris must simply be taken whenever it's offered, so our first taste of the game is the Coalition Campaign, which covers the years from 1805 to 1812. For any

Empire veterans, it sounds like a very short game, but this is just the start of the overhaul the game's received between iterations.

...without opportunity

Most of the Total War games have featured bi-yearly turns, but Napoleon's turn system is bi-monthly. Movement distances, recruitment times, even the effects of seasonal weather and trade, have all been re-jigged with this in mind. It's a real pleasure to watch the campaign map change with each month, from the deepening browns of autumn to the snowfalls of winter.

A lot of players really don't notice the passage of time in Total War games, as the yearly turns are quite abstract, but monthly turns really make you think of the turning seasons. What's more, you'll want to be very careful about getting caught in the open in winter – in any turn where an army is not in a town or city, it loses men to desertion, fatigue and lack of provisions. Winter makes this even worse – so be careful if you try to invade Russia!

All the usual building and technology management is present, though the tech tree has been vastly simplified to fit the tighter timescale. Diplomacy is a lot more detailed and reliable now, and the ability to turn some regions into independent protectorates is a real boon, while the wiliness (or, at least, ratty cunning) of your enemies and allies can see you outfoxed diplomatically as you might if you lost an important battle. Gentlemen make a return, though rakes and priests are nowhere to be seen; honestly, they're not missed.

Infantry recruitment is still pretty speedy, however, and it's possible to get a regiment on the go in a turn or two – that's just how militarised a lot of nations were in the period. Shipbuilding, however, especially when you start laying down hulls for stupendously large 122-gun first rates, requires a bit more forward thinking. You'll want to be taking advantage of any breathing room (financially and militarily) to get your navy in order before you start taking losses, as replacing ships takes time.

One of the reasons you should make hay while the olde time sun shines is because the opposing AI, in both campaign and realtime modes, is much more aggressive. They'll raid your harbours, break your blockades and get very intimate with your trade shipping; when push comes to shove in real time, a clever AI general might even use such tactics as probing your defences, false withdrawals, and more. We're not sure just how much tweaking has gone on behind the scenes, but winning the day in N:TW requires a lot more forethought and planning.

As in Empire, the humble Line Regiment is the backbone of any army, but there's a host of other ancillary units to enjoy, from Lancers

(cavalry with especially long spears, that were the scourge of disordered infantry), Dragoons (who can fight on horseback or foot), a range of artillery of various calibres, and of course, if you're a Brit, Riflemen (elite sharpshooters recruited for their intelligence and vigour, rather than just because they can use a gun).

There are some new abilities available for these units, too, most notably the ability to use an Artillery Barrage once you unlock the technology; with this, you increase the fire of your cannon to a fever pitch, but you can only do it a few times in each engagement. As in the period, massing your guns into one battery makes the most of this tactic, and delivers a frightful result on the enemy – and the terrain.

Combat by sea has seen arguably the most improvement of any aspect of the game. Each type of vessel now seems to have a lot more variation in not only its sailing qualities, but also its effectiveness in combat. The enemy AI is also now much more likely to turn and run if outnumbered or the battle is going against them, turning some fights into tense pursuits and contests of accurate gunnery. Sea combat also just feels a lot... nastier, thanks to visual effects like the recoil of a ship's broadsides forcing it to rock in the water, or that same broadside hitting home causing a similar (though more devastating) effect on the enemy.

War is the business of barbarians

There's a lot of new graphical flourishes on the realtime maps that add a huge amount of flavour to the game, and that add to the gameplay. Weather, like heavy rain, can decrease line of sight and dampen powder, as well as slow movement; forests are much more built up with undergrowth, with the effect that keeping track of troops in a forest is a serious challenge – and getting ambushed in one is even worse!

Then there's the direct effects of battle upon the landscape – and your men. Artillery shot now leaves craters and long gouges in the landscape, for instance, as well as gaining the ability to knock down entire ranks of men, as well as killing those in its direct path; cannons can now not only cause lots of damage, but their ability to disrupt an attack cannot be underestimated.

On the more cosmetic side of things, riderless horses gallop across the battlefield, and leaves and other detritus blow through the air; there's more variation amongst the troops even in a single regiment than ever before. Looking at a fight from ground level, it's easy to believe you're playing some first person adventure game, not a grand tactical and strategic military simulation!

March to the sound of the guns!

It really is amazing how great Napoleon is. Each little AI tweak, or graphics boost, adds up to make it feel like it's been years since Empire, not just months. N:TW obviously builds a lot on Empire, but once you're in-game for a few hours it simply feels like the ultimate expression of the Total War franchise. And all this without even having a chance to mess about with multiplayer yet – the new drop in battles system, which will allow friends to drop into your campaign and play enemy generals, looks like a great tweak. About the last thing needed to make the game perfect would be proper multiplayer campaign battles, with a dozen or so players.

Of course, when that happens, you'll likely never hear from us again – we'll be in wargamer heaven. For now, though, we're pretty bloody close. **DH**

PC

Developer The Creative Assembly
Publisher Sega
Website www.totalwar.com/napoleon

Graphics 96
Across the board improvements make this the prettiest strategy game today.

Gameplay 100
Years of challenge, punctuated with moments of perfection.

Sound 89
More sound files of screaming Frenchmen than you can poke stick at.

Overall
Simply the best game in the series to date, and an early contender for best strategy game of the year.

99%

MOVIE REVIEW

Shutter Island

A mixed bag from one of the greats of modern American cinema.

Director Martin Scorsese
Starring Leonardo Di Caprio, Ben Kingsley, Mark Ruffalo

Martin Scorcese is one of Hollywood's most curious directors. He's more than capable of throwing out instant classics like Raging Bull, Goodfellas, or Taxi Driver – films that are not only masterclasses in the director's art, but run counter to what we can only call the Hollywood System. At the same time, though, he's more than happy to work in that system and create made to measure hits, like The Colour of Money or The Departed. Shutter Island – currently soaring to impressive financial heights at the box office, is as curious a piece of cinema as its enigmatic director.

Up front, we've got to say it – there's a twist, and it's the kind of twist you either won't see coming or will see from a mile away. To its credit, foreknowledge really doesn't hurt the film's drama, but it does leave the viewer confused in hindsight. For instance, the film's opening sequence is so spottily edited, and other scenes so poorly overdubbed, that Shutter Island at times comes off as amateurish at best. But then, twist, and you're left wondering... was that meant to mean something?

If so, it's a typically brave move from Scorcese, but it does make the opening act very difficult.

There's also a certain element to Leonardo Di Caprio's performance that really only makes sense in hindsight, which again makes it hard to judge his performance. His accent, however, is another thing – it's like Scorcese and Di Caprio hang out laughing at Boston accents, and whenever a coin flip lands on heads Leo has to bung one on.

But for all its faults, there's a taut psychological thriller in Shutter Island, and it really takes off in the second act.

The basic premise is simple: a mysterious escape attempt from an island-bound insane asylum leads two US Marshalls (or, as Leo puts it 'Maah-shells') to be assigned to the case. The escape itself seems impossible, and yet... the fact is a woman guilty of a heinous crime is missing. To complicate things, Leo's character is damaged goods himself, dealing with post traumatic stress from both what he say in the closing days of World War 2 and by his wife's recent death in a house fire.

But nothing's as it seems, and pretty soon Di Caprio must trust his instincts. The growing sense of unease draws you in until the you forget your early misgivings; the cast is great, especially Max von Sydow and Ben Kingsley as the asylum's two doctors.

It's a mixed bag, really. While it can be argued that keys scenes have been edited with a certain end in mind, what it really feels like is that certain scenes did not play well with test audiences, so they were hastily recut for release. Which is a shame, because we suspect we'd have no reservations about this taut thriller without the dodgy editing and sound.

As it is, this is still an entertaining film – though we're stunned at its box office success. **DH**

DISC OF THE MONTH

Okay, let's talk straight here – if you see only one futuristic-bounty-hunter-comes-to-earth-to-hunt-a-monster-before-it-slays-a-Viking-village-movie this year, then it should be Outlander, our runaway Disc of the Month.

Okay, it sounds kinda schlocky, but it rises so far above its B-movie roots that you'll be hooked in the first five minutes. There's nary a plot-hole to be found, either – it's well-plotted, has a great cast (Ron Perlman AND John Hurt!), and some really stunning creature effects.

And a Viking burial! Verily, it's a nearly perfect bounty-hunter-comes-to-earth-to-hunt-a-monster-before-it-slays-a-Viking-village movie.

We've also been entertained by the new Halo Legends disc – not every animated film in the collection is perfect, and sure they were all available on Xbox Live before now, but there are some on there we're happy to own and watch again.

The Battle for Sydney

Atomic leaps into the nerdiest laser skirmish yet.

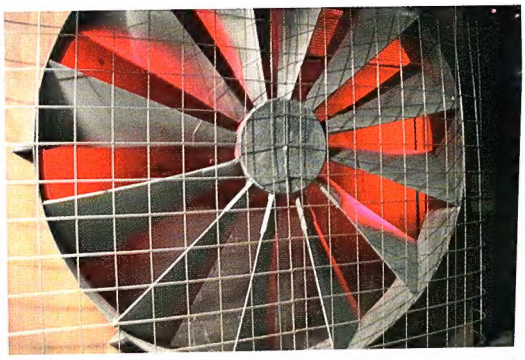
Laser skirmish, once the domain of the stereotypical nerd and pastime of the geek, is something that is an essential piece of the lifestyle puzzle for many Atomicans. While it doesn't have the same level of physicality that paintball might, it has an excitement all of its own - so when a new Strike Laser Skirmish opened up in Sydney, we had to give it a shot.

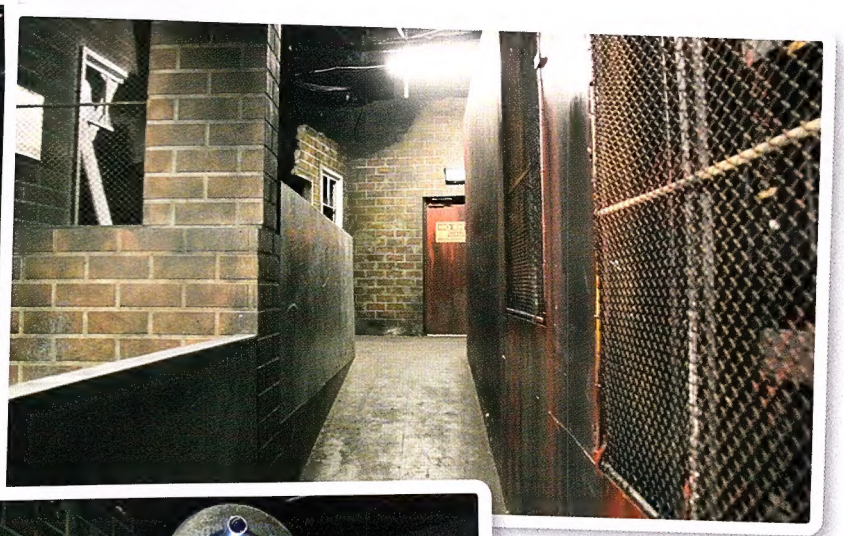
Located relatively centrally in the Sydney Showground, this particular laser skirmish arena is uniquely themed to offer a theatrical, if sometimes whimsical, experience. The year is 2050, and you play the role of a crack soldier who fights in the Battle for Sydney: a war which is fought over access to drinking water. Drought isn't usually good enough cause for futuristic gun battles, but it's a good enough excuse as any.

As you enter the darkened and UV-lit briefing room, a short video begins that explains all these little details, as well as explaining the functionality and lethality of your RT-306 Assault Rifle. In reality all the rifles shoot are harmless infrared beams, but we'll suspend our disbelief for now and see them as the deadly beams of death that they really are - with two distinct firing modes available. Phasor is billed as a narrow-beam sniping mode, but ultimately proved to be simply too difficult to aim well enough (unless you've got steady surgeon hands, then it'll work out fine for you). The Blaster is our favourite of the two, a shotgun-esque mode that blasts in a roughly 10cm radius to inflict a decent amount of damage, at the cost of an ammo meter that has to recharge before firing can resume.

After strapping on the relatively light vest, and gripping your rifle, you're plunged into the laser arena. We first gave free-for-all a go, and as its name suggests it was about as delicate and

The weapon display is very informative, showing off vital details at a glance. There's also plenty of appropriate detail on show around the complex.

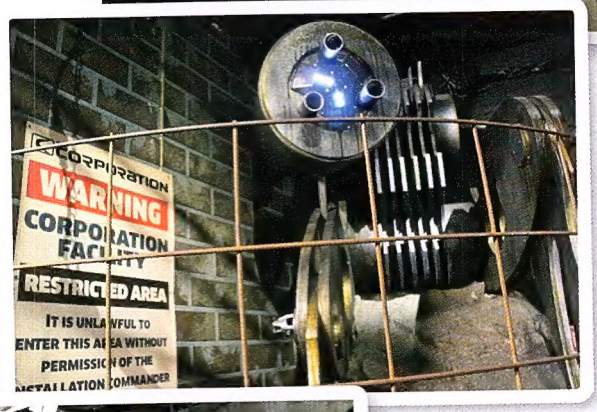




precise as a blue whale giving a high-five to a baby seal. A total of ten soldiers entered the arena of a possible 24, though it was never too long before you found someone to shoot - or were shot yourself. However, this isn't your standard boring arena.

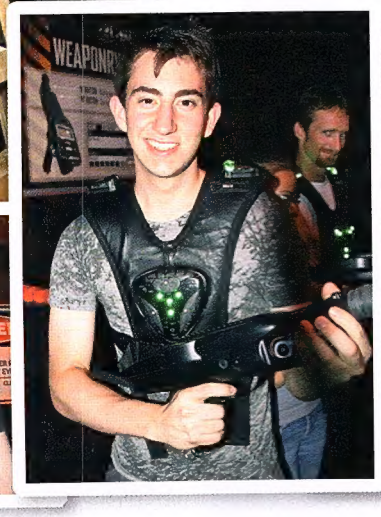
One million dollars has been poured into the place, fitting it out with three distinct areas, each with its own distinct lighting and theme. The lower level is a darkened, wide-open space that contains the base of what appears to be the leg of a gigantic machine, with broken ironwork providing limited cover in one corner. The special feature on this level is a lighted gate; pass through it while green or blue and you'll receive a health bonus or rapid fire ability, but pass through when red and you'll lose power to your shields.

The middle ground is the most contested of all three areas, containing real brick walls and broken windows. It's exactly like fighting within a broken and abused warehouse, though this warehouse also houses corrugated pillars that provide decent cover but leave one side completely exposed, as you dodge between them on your search for targets. This level is made even harder with the presence of an automated chaingun-wielding robot, whose sensors detect the passage of your vest sensors - and he'll soon pummel you with enough lasers to roast a pig.



The final top level is reached by a single access ramp that connects to the middle level, a treacherous walkway that features cutouts that you can shoot out from - or be shot in. Once you reach the top, a maze of what seemed to be discarded (yet very futuristic) office cubicle walls are arranged in a random pattern, providing twists and turns that proved exhilarating to chase people through.

Pricing is pretty good for the amount of awesome you get out of it, with one game costing $16 and two running you $24, but there's also a lot more to do than just bowl. A fully-stocked bar lies not twenty metres from the laser arena, with two soundproofed karaoke rooms (or as we found out, not quite soundproofed enough!) and arcade machines on the same floor, and an entire bowling alley one floor up. It really is a great place to go to fulfil that inner geek inside you, and no matter your skill or fitness level, there's definitely something here for you to do. As for Atomic's performance in each game, well, we were legendary. **JR**



Gigantic fans, auto-killing robots, real brickwork and obstacles abound. Atomic is more than ready for a fight! Well, a laser-fight.

Un-Reality Quest

Virtual reality is here now, if you know where to look. **Ben Mansill**'s there waiting.

Ooookay... I'm *in* the game! Playing Wolfenstein, with its illusional tricks of the eye and mind made you part of the spatial world. It was wild, it was drop-everything-else addictive, it was really good before, after or during a beer, or whatever.

From being a little NORAD General controlling armies on a 2D screen, now gaming was about *being there*. This was impossibly cool, and clearly just a stepping stone in a quick rush to the VR goalposts. It was instantly apparent, if you just thought about it for a minute, that a NASA-style development drive would very soon deliver us the proper virtual reality that was always accepted as inevitable. A mere formality of time.

It made sense. Playing it on a goldfish bowl 15in CRT with bleepy sound and a hateful ball mouse, it was a joyous time of confidence in the future. When Doom hit the pace quickened and confidence was complete. Gaming was going to be one paradigm leap after another until we were all happy brains in vats living a pretend life. Sweet as!

The VFX1 was the first punch in the guts of hope. A consumer VR headset for a few hundred bucks that looked like a Star Wars movie prop? Bring it! Crushingly, about 10 minutes after testing it I was dejected and down with a sore neck and a big red welt on my forehead from the weight and unbalanced ergonomics of the thing. Instead of being encapsulated in a computery world, you're staring in the dark at a small and distant 4:3 screen hovering in black space. Equivalent to a 120in screen at 11 feet, they say, but even that sounds better than the actual crappy experience.

Steering around the game was slushy and imprecise, and you needed to literally turn your body on the spot constantly to drive the 3-axis motion sensing. It wasn't in more than a minute that the control cord to the 'puck' controller was tangled around your legs. This wasn't *virtual* anything. It was a *real* pain in the arse. Okay, give up on that.

VR for the gamer was not looking good. Nintendo's Virtual Boy just underscored that this tech was going in exactly the opposite direction to what we wanted. Other tangential efforts to bond us closer to the game flared then fell too. A brief trend in crazy FPS controllers was met with scepticism, correctly so, attempting to add a touch of realism by replacing the non-sexy mouse and keyboard with a futuristic 'natural and intuitive' game interface. They were all hopeless.

The Big Leap was clearly not forthcoming any time soon. So we sat back and continued to enjoy a steady stream of kick-arse 3D games over the ensuing years, not realising that the march to VR was going on all the time, just in evolutionary, incremental movements.

It first hit home that the road to VR was back on track when I first played a game on a 30in monitor, pulled up nice and close.

Little things like mice got a million times better, no more cludging it with a dirty mouse ball, now it was think: and it happens. Surround sound got amazing quickly. Graphics, of course, got ballistic batshit crazy awesome. Controllers got force feedback.

It first hit home that the road to VR was back on track when I first played a game on a 30in monitor, pulled up nice and close to my face on the desk. Loading up Far Cry I'm realising two things – first that I can't see the monitor's bezel. There's nothing but game, my peripheral vision is filled, I am there! Then it occurs to me that the arms and gun on screen are just about the right size to be real. Big like mine. I'm holding a gun. On a lovely island. I'm no longer in my computer room at home. I can't see the kitchen light in the corner, I can't see anything but the game and my brain welcomingly adjusts to this in an instant. Sweet, welcome gaming nirvana.

Now add TrackIR. An oft-dismissed niche curio that is, and I cannot shout this out through the page at you loudly enough, the single most awesome must-have gaming device available. It makes the world real, and your part in it natural and convincing. A sensor sits on top of your screen and you wear a cap with the same positional markings used by motion capture movie suits. Move your head, and the game view follows. Movement is smooth and proportional.

The trick bit is that your eyes subconsciously stay within the screen's boundaries. Turn out the room lights and you're in. Do it on a 27in or 30in screen and you're there. It's not weird, it's natural and it's epic fun. It's also a most elegant and superior (for now!) alternative to gloving your head in a crappy helmet. Driving and sims make up most game support for TrackIR, but so does Arma2 and you won't want to play an FPS any other way after you've had a go of that.

I'm finally the dude inside the screen. I'm driving a car, or flying a chopper. I'm a soldier in a forest. Hands, feet, fingers and head are fully engaged. All around me swings the shifting soundscape. My vision encompasses only a huggable virtual reality. I turn my head, and I'm looking out the window. I'm not *thinking* about doing any of this.

I still know it's just a game, that's cool. That's awesome. One day it'll look real too, and with whatever tools we use to play then, I'll be there.

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